PUBLIC WORKS

Oct. 1954

CITY, COUNTY AND STATE

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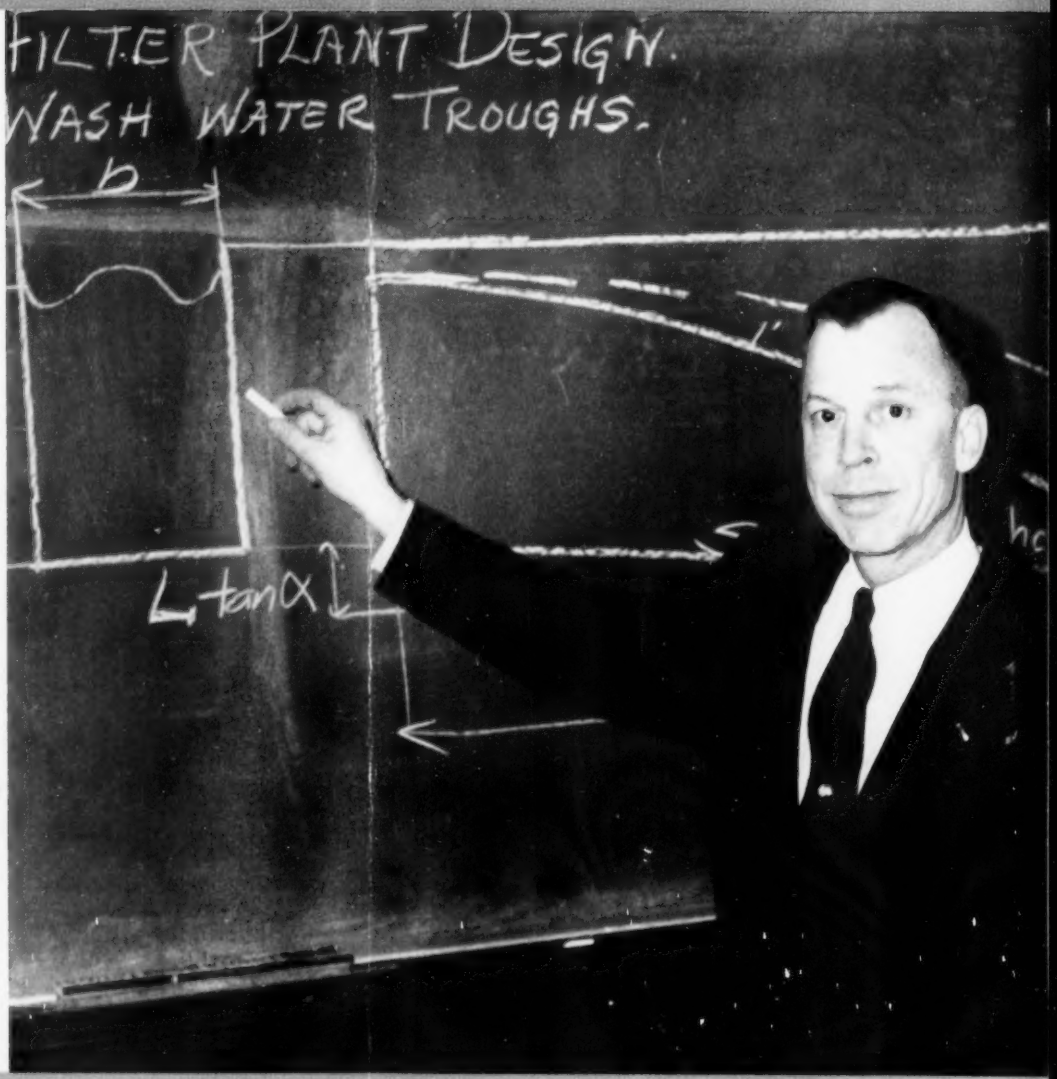
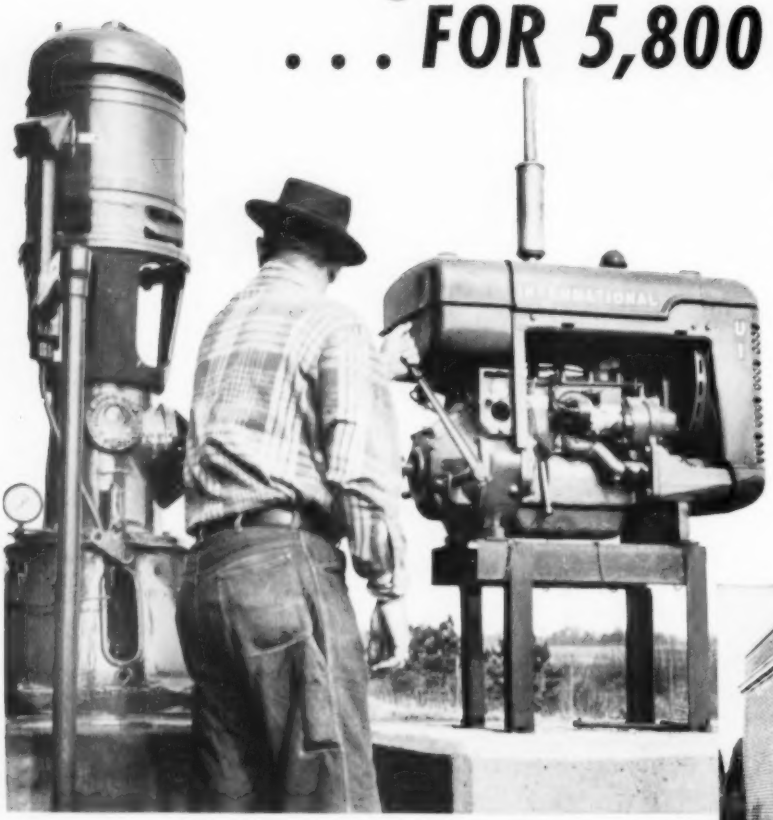


Harold B. Gotaas, shown here in the classroom, is Professor of Sanitary Engineering of the University of California and Director of the Sanitary Engineering Research Laboratory there. More about him on page 26.

Watch Dogs of the Water Supply

. . . FOR 5,800 FAMILIES



ON THE ALERT for any power failure that threatens the water supply are Latham's assistant superintendent, Walter Willder, and an International U-1 gasoline engine ready to take over with a throw of the clutch.

PROGRESSIVE MANAGEMENT is reflected in this well-planned and maintained pumping station of the Latham Water District. The International standby power unit shown maintains water pressure if electric power fails.

International engines stand by on 24-hour call for the Latham Water District in the land of Ethan Allen

Like modern minute-men, three International engines guard Latham's water supply against sudden power failure. This is part of progressive Latham's program of service to the thousands of upstate New York families and many industries it serves.

Like Latham, many Water Districts today are finding International the power to count on in a pinch, and because International is recognized everywhere for good work, stockholders, voters and utilities executives respect the purchase of International as sound judgment.

So get down to cases with your International Industrial Distributor or Power Unit Dealer. Let him show you installations in your neighborhood where Internationals are delivering the goods. Go through his modern service shop and complete parts department, and watch his trained mechanics in action.

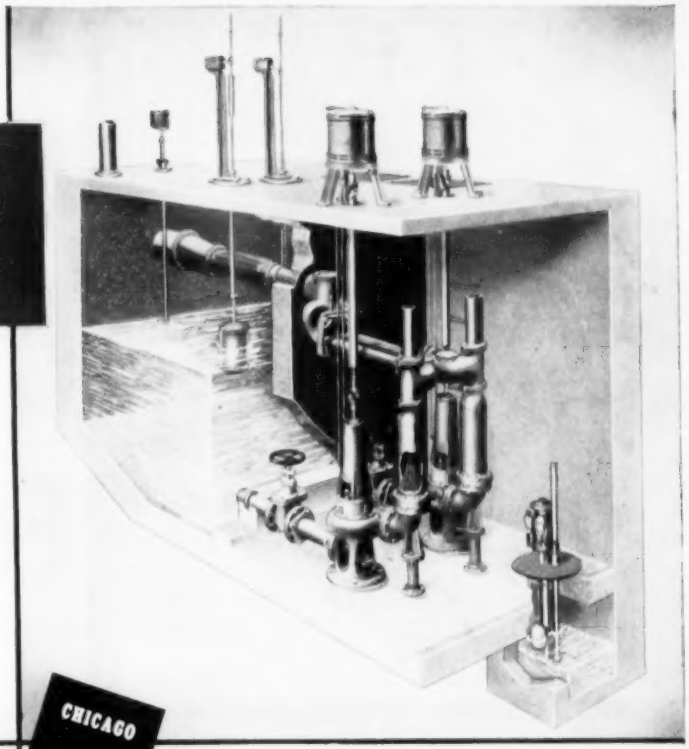
Then you'll know why you, too, can rely on International *"Power that Pays!"*

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

INTERNATIONAL INTERNATIONAL HARVESTER **MAKES EVERY LOAD A PAYLOAD**

OVER 12,000 IN SERVICE

FLUSH-KLEEN
SEWAGE EJECTOR



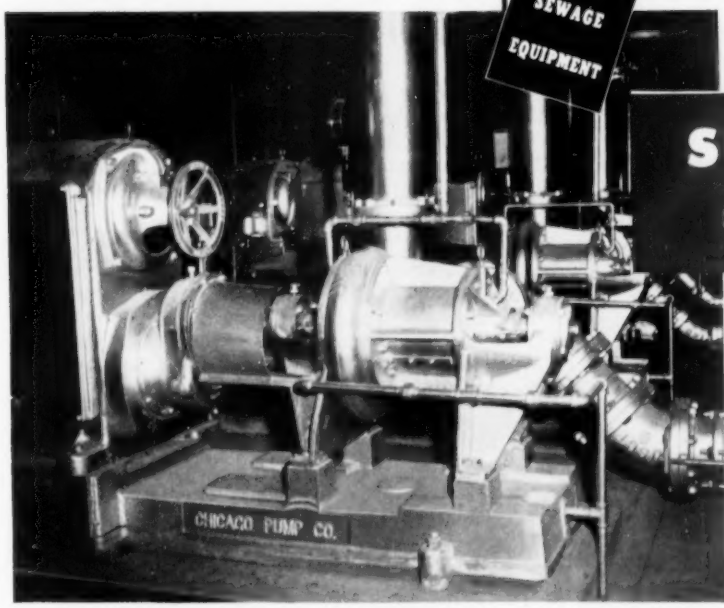
CAN'T CLOG — Only Liquid is Handled by the Impeller

The Flush-Kleen is the *only* truly clog-proof sewage ejector! It strains out coarse matter, then backwashes the strainer for reliable, low maintenance operation. No strainer baskets to clean, no repairs due to clogging, no foul basins because it keeps solids out of the wet basin.

Flush-Kleens last longer and require less power, too, since there are no severe strains, jams or high friction due to handling coarse materials.

Cross section of typical Flush-Kleen lift station. Discharge pipe is cut away to show strainers. ▶

CHICAGO SEWAGE EQUIPMENT



OVER 8,000 IN USE . . .

SCRU-PELLER
SLUDGE PUMP

Scru-Pellers chop all coarse material into small pieces that cannot clog or slow pump. Simple design insures long life and positive pumping. When specified, can be furnished with variable speed drive to permit selection of pump speed and torque that matches consistency of sludge.

◀ Three of 27 Scru-Pellers installed at the Hyperion Plant, Los Angeles, Calif.

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622 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

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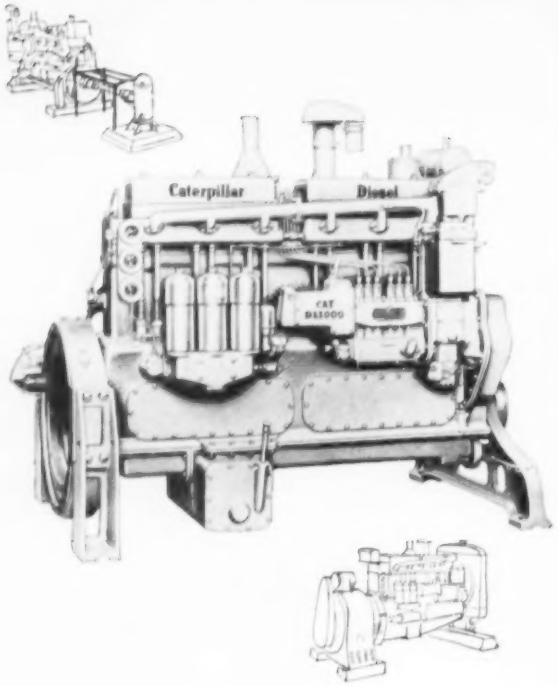
Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Comminutors



Announcing the

NEW 190-HP CAT* D13000 ENGINE

CATERPILLAR ADVANCED DESIGN FEATURES IN THE NEW D13000

While retaining such time-proved features as aluminum alloy main and connecting rod bearings, "Hi-Electro" hardened and Superfinished bearing surfaces, exclusive Caterpillar fuel injection system, ability to use low-cost No. 2 furnace oil without fouling, etc., the new D13000 incorporates many new features, among them:

NEW Valves, Inserts, Rotators—new components, standard in the breathing system, combine increased breathing ability with longer valve life—make possible additional horsepower output and lower maintenance costs.

NEW Vibration Damper—sturdy, metal-enclosed, fastened directly to front of crankshaft. Keeps unit vibration-free at higher speeds. Optional in installations where engine speed is kept below 1000 r.p.m.

NEW Camshaft—improved high lift cam profiles give smooth valve seating and increased breathing ability. This increased capacity, also made possible by new oil-bath air cleaner and larger intake and exhaust manifolds, insures low exhaust temperatures and adequate reserve power.

NEW Water Pump—larger, with a greatly increased capacity to answer cooling needs of this modern, high-powered diesel.

NEW Pistons—oil-cooled, made of high-strength, lightweight aluminum alloy with stainless-steel heat plugs in the high-temperature zone and cast-in iron bands for the top ring groove to give best service at lowest final cost.

NEW Oil Pump—features not just one, but two pressure controls to assure correct lubrication for all moving parts from the first turn of the crankshaft.

For complete details, specifications, attachments, etc., see your nearby Caterpillar Dealer

...yours for greater power, protection, tax savings!

For years, in many towns and cities, the Caterpillar D13000 Engine has proved itself a dependable source of main or standby power for water pumping, lighting and other municipal needs. Now comes a new D13000, designed and built to bring you even greater power, protection and economical operation!

In the new D13000 you get 21% more horsepower. Its governed speed, raised to 1200 r.p.m, provides increased versatility. While keeping outstanding time-tested parts, it adds advanced design features to set new standards for dependability, economy and long life. And its wide variety of matched accessories and attachments makes it readily adaptable to almost any need.

For uses requiring power in the 145 (continuous) to 190 (intermittent) horsepower range, your best buy is this rugged new Cat D13000 Engine. The new Caterpillar D13000 Electric Set, self-regulated or externally-regulated, generates 100 KW.

Get the *complete* facts about these new units from your nearby Caterpillar Dealer.

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PUBLIC WORKS MAGAZINE

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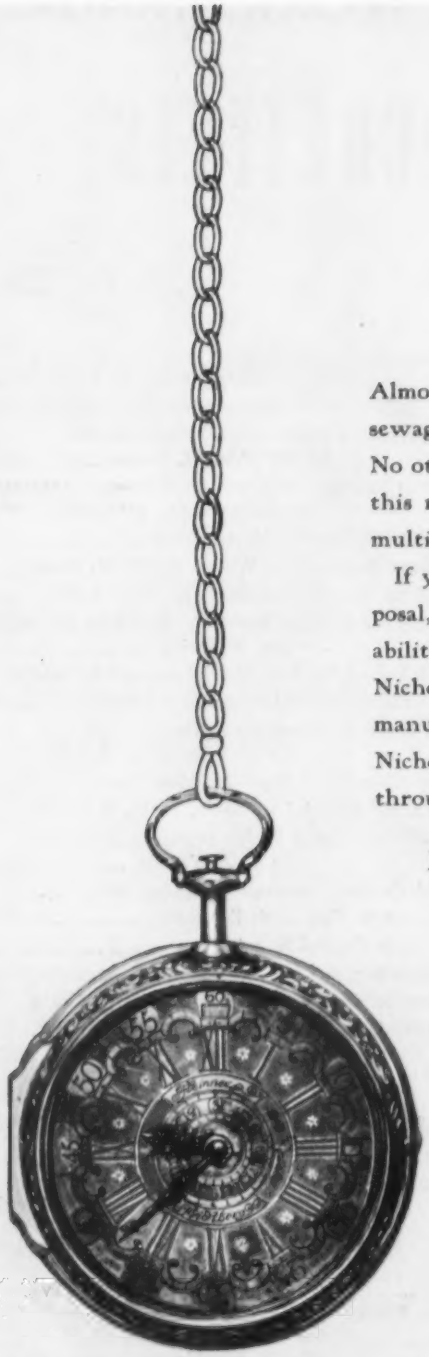
THE MOST USEFUL ENGINEERING MAGAZINE FOR CITIES, COUNTIES AND STATES



50,000

hours

Almost six years, 50,000 hours, of uninterrupted sewage sludge incineration without a shutdown. No other sludge incineration system has equalled this record, established by a Nichols Herreshoff multiple hearth dryer-incinerator.

If you want dependable, economical sludge disposal, provided by equipment of proved dependability, economy and rugged construction, consult Nichols, an organization experienced in the design, manufacture and installation of more than 5000 Nichols Herreshoff multiple hearth furnaces throughout the world.

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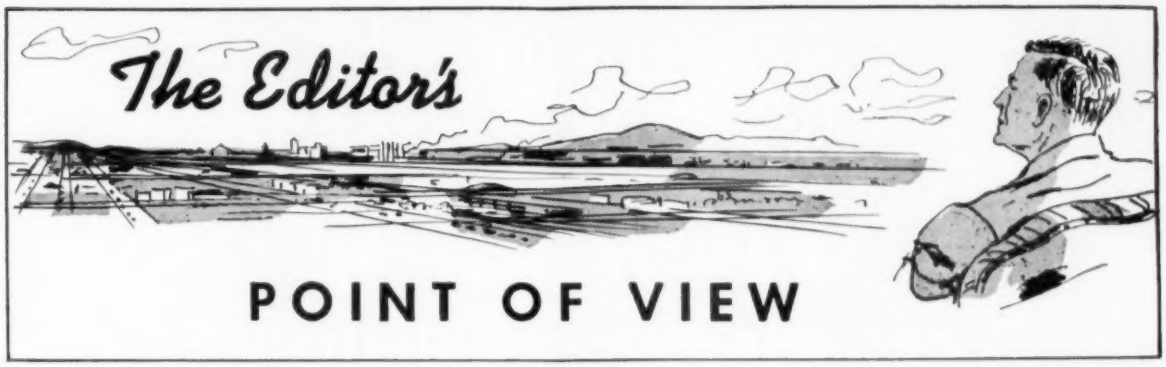


Our Aerial Mapping Program Should be Extended

THE many values that are available from good aerial maps provide ample reason why the program of mapping the many presently unmapped areas in this country should be pushed vigorously. Since the mapping that can be done by governmental agencies is limited, and because it is sound procedure to utilize private resources and skills to the utmost, this mapping program should be carried out to a considerable extent by aerial mapping specialists. The work will be expedited, resources and skills exceedingly valuable to the nation will be developed and the co will likely be less, all things considered.

Our mapping program has, like many other desirable projects, not kept up with our needs. This is excusable, but that is no reason why immediate and energetic steps should not be taken to correct the deficiency.

There was Never a Greater Need Nor a Greater Opportunity

NOT long ago on this page we spoke of the plight of our water distribution systems—laid out perhaps forty or fifty years ago and now unable to cope with the demands for water that are far above what the engineers of those days had any right to expect. But this unenviable position is by no means restricted solely to water works. Our sewer systems are pretty much bursting at the seams, both storm and sanitary. It is not that it rains more than it used to, but paved streets, roofs and other impervious areas have been increasing steadily. As to sanitary sewers, the problem is about the same as with water distribution systems, only the reverse. Increasing population and greater water use—along with more people tied onto the end of each line—are the causes.

Of course everybody knows that our highways and streets are in the same condition; in fact, because these facilities are out in the open and everybody uses them, there is much more vocal complaint about them than about sewerage or water—unless the sewer backs up or during a dry time no one can water their lawns.

Ten years of depression, five years of war and several years of shortages are principally to blame. But the fact is inescapable that these shortages exist in serious measure. As such, they are a challenge to engineers to solve. We need a bold and original, but sound, approach; and if enough engineers think hard enough about these problems, a better method of handling them will be developed. We don't expect magic; nor do we expect that engineers will fail to find sound and economical solutions.

Better Refuse Disposal is Needed—and Fewer Open Dumps

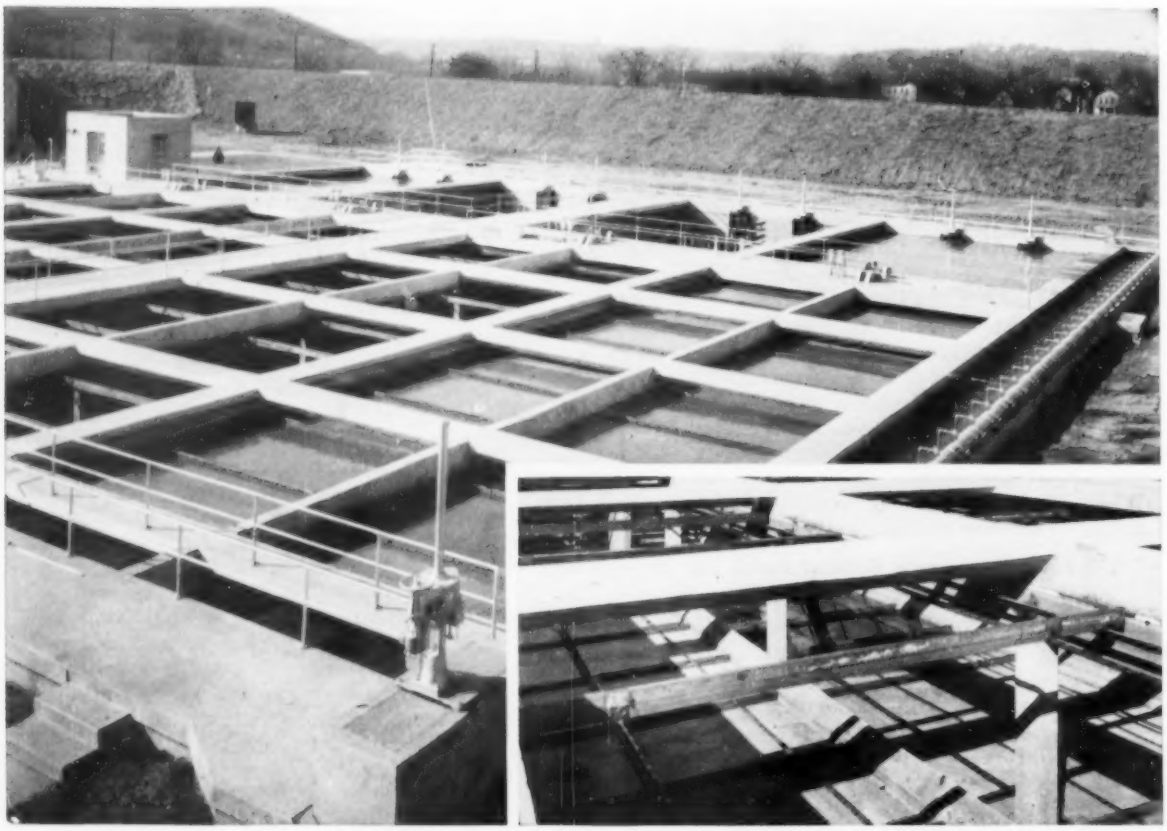
REFUSE disposal is something most everyone seems to be interested in, but too few do anything about so far as their own communities are concerned. Probably half, maybe more, of our communities still maintain the pestiferous and highly objectionable open dump. Both sanitary fill and incineration are available to do a good job in refuse disposal if there is any earnest local desire to do that kind of a job. Grinding of garbage, thus eliminating the most objectionable portion of these wastes, is also making rapid strides. In May, we published an article showing how garbage grinders in a state hospital for the mentally retarded have largely solved the serious garbage handling problems common to so many such institutions. Composting is of great interest to many because it holds out the promise—at this time, we believe, a faint and long distance promise—of profit from what has heretofore been wholly a liability.

Whatever the method used, however, someone in authority in each community must make up his mind that refuse disposal will be accomplished in a sanitary and modern manner; and he must have the force and the energy to see that this is done. When that condition is obtained, a good job can be done, whether sanitary fill, incineration, grinding or composting is utilized. All can be good; it is the man behind the program that counts.

Now and Then a Timewaster

FOR a little mental exercise, if A, B, C, and D represent whole numbers, balance the following equation: A + B + C + D = ABCD.

It pays to rely on LINK-BELT— ONE SOURCE...ONE RESPONSIBILITY for water, sewage and waste treatment equipment



STRAIGHTLINE COLLECTORS—Cincinnati's Little Miami Sewage Treatment Plant (Havens and Emerson, consulting engineers) uses Link-Belt equipment in keeping the Ohio River pure as water supply source of communities along its 900-mile system. Gentle action of Straightline collectors allows high capacity sludge removal without disturbing settling process. Installation is first step in $50,000,000 project.

IN MANY cities — large or small — Link-Belt sanitary engineering equipment provides efficient, long-life water purification and sewage treatment service. And in industrial plants of all descriptions, Link-Belt waste treatment equipment removes solids from waste water. Stream-pollution is abated and frequently valuable by-products are recovered.

Shown here is part of the broad line of Link-Belt sanitary engineering equipment. If these photographs suggest a solution to your treatment problems, get in touch with the Link-Belt office nearest you. A Link-Belt sanitary engineer will be glad to work with your engineers, chemists and consultants . . . help you get the finest in modern treatment equipment. In addition, catalogs on these products are available on request.

VISIT OUR BOOTHS 55-56 — SEWAGE WORKS AND INDUSTRIAL WASTES CONVENTION — CINCINNATI, OHIO — OCTOBER 11-14

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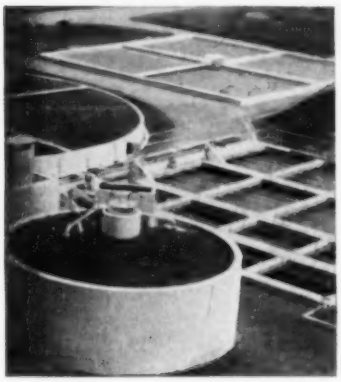
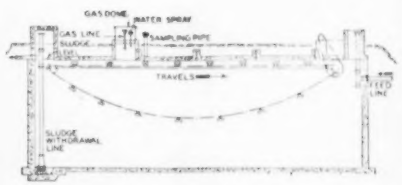
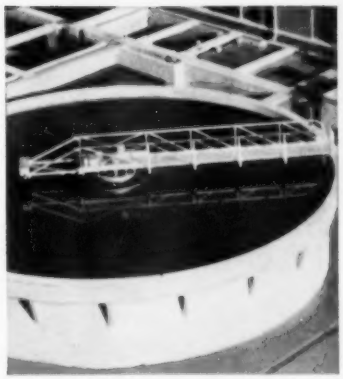


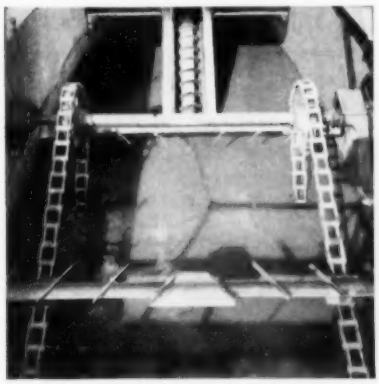
BIO-FILTRATION SYSTEMS use high-rate shallow filters and recirculation of effluent from filter to settling tanks in single- or two-stage treatment.



SCUM BREAKERS are installed in either round or rectangular digestion tanks to break up the floating scum as well as paddle down and submerge it. Mats of scum are prevented yet no breaking down by hand is required.

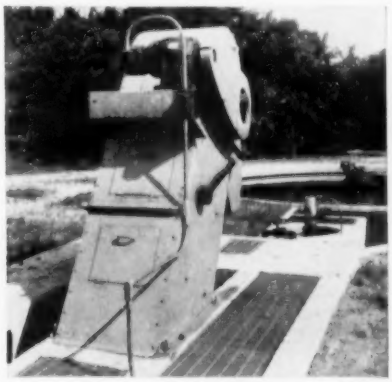


CIRCULINE COLLECTORS — "Straightline Action" assures quick, positive sludge and scum removal from the entire tank in the shortest time without septicity.

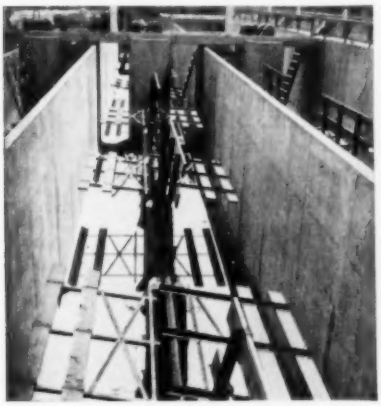


GRIT COLLECTORS AND WASHERS effectively collect, remove, wash settled grit and separate it from putrescible organic matter.

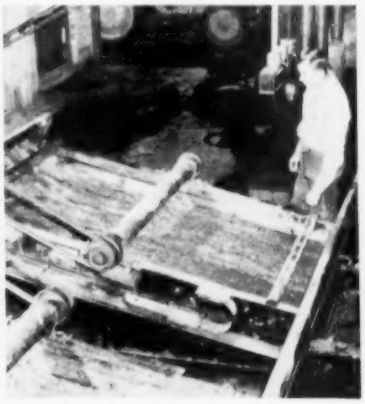
THRU-CLEAN BAR SCREENS — Remove large floating particles from large volumes of water, thus protect other equipment.



TRITOR SCREENS — For small sewage treatment plants — remove both grit and screenings with one mechanism.



CHEMICAL MIXERS — Link-Belt builds Straightline (shown) and flash mixers. Efficiency is assured by operation at variable speed for maximum floc formation.



LIQUID SCREENS have proved efficient and economical for removing solids from industrial liquids. Available in several sizes with coarse or fine cloth.

CONVEYORS AND ELEVATORS are built in a complete range of types and sizes for handling bulk or packaged chemicals. Leak-proof Flexmount Conveyor is shown.

OTHER LINK-BELT PRODUCTS INCLUDE: air diffuser units, non-clogging spray nozzles, traveling water intake screens, rotary screens, Roto-Louvre sludge dryers, chemical handling machinery, car spotters and haulage systems, a complete line of conveying, elevating and power transmission machinery.

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Ask your nearby Allis-Chalmers dealer to demonstrate any of these budget-stretching machines

MOTOR GRADERS

for heavy-duty grading .

Model	Brake Hp	Weight, lb	Speeds, mph
AD-40	104	23,000	6 forward to 20.4 3 reverse to 7.0
AD-30	78	22,700	6 forward to 20.4 3 reverse to 7.0
D	50	8,800	4 forward to 25.6 reverse to 3.3

Famous ROLL-AWAY moldboard, high axle and throat clearance give Allis-Chalmers AD motor graders added capacity for BIG output. Tops for service simplicity, convenience.

CRAWLER TRACTORS

for sanitary refuse disposal .

Tractor	Drawbar Horsepower	Weight, lb	Speeds, mph
HD-5	40	11,250	5 forward to 5.5 rev. 2.0
HD-9	72	18,800	6 forward to 5.7 3 rev. to 4.4
HD-15*	109	27,850	6 forward to 5.8 3 rev. to 4.5
HD-20	175**	41,000	3 forward to 7.0 rev. to 5.5

Allis-Chalmers Tractor Shovels are made to order for the popular sanitary landfill method of garbage and refuse disposal. They can do the complete job . . . excavate trenches, spread and compact refuse, apply an even cover of dirt fill. Many features add to their cost-cutting work capacity. Other attachments replace bucket to keep unit busy on other jobs all year long.

**Net engine hp—torque converter drive
*Also available with torque converter drive—135 net engine hp

MOTOR SCRAPERS

Motor Scraper	Hp	Capacity — struck yd	Speeds, mph
TS-300	280	14	4 forward to 22.5 rev. 3.5
TS-200	176	10	5 forward to 21.6 rev. 2.5
Motor Wagon	Hp	Capacity, struck yd	Speeds, mph
TW-300	280	14	4 forward to 22.5 rev. 3.5
TR-200	176	11	5 forward to 21.6 rev. 2.5

Allis-Chalmers Motor Scrapers are job-tested and job-proved. They provide a means of moving large quantities of material fast and economically — feature highest horsepower per struck yard of capacity, high speed. Let your Allis-Chalmers dealer show you one at work. Compare it feature for feature, yard for yard and dollar for dollar with any other machine in its class.

Thousands use our Readers' Service card to keep up to date . . . do you?

. . . . construction, maintenance . . . all-around work

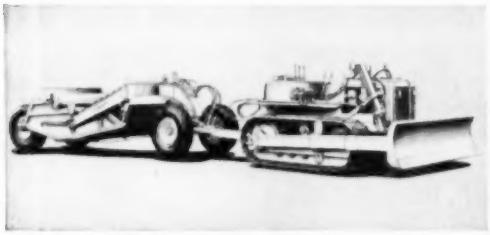
Safe, quick, one-pass shoulder maintenance with Model D and maintainer attachment.

The handy Model D grader—first low-cost machine to offer tandem drive, single member tubular main frame and the ROLL-AWAY moldboard. Interchangeable attachments make it usable all year: rear-end loader and shoulder maintainer, scarifier, both blade and V-type snowplows. With all its features, the Model D cost is still only one-third that of a large grader.

One-man, one-machine street department — rough grades, spreads, cleans up, loads trucks with ⅞-yd loader.

SCRAPERS

. . . . earth moving . . . dozens of jobs



Four handy tractor shovels to choose from. The HD-9G, 2-yd capacity shown here, gives unmatched utility at lowest possible cost.

An Allis-Chalmers HD-5 Tractor with dozer blade plus four-yard AC-44 scraper adds up to a real dirt-moving value. Versatile enough for grading, filling, dozing, clearing and many other jobs.

Scraper	Capacity — struck yd	Capacity — heaped yd	Weight, lb
AC-314	14	18	24,350
AC-108	8.4	11	15,250
AC-106	6.1	7.5	10,300
AC-44	4	4.7	6,595
AC-24	2	2	2,540

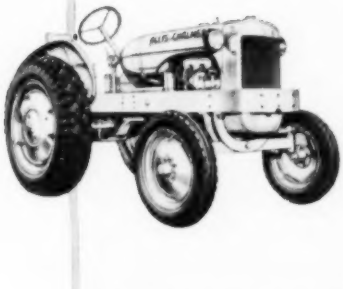
Other attachments interchangeable with shovel include dozer blades, rock bucket, trench hoe, rock fork, many others.

TRACTOR SHOVELS

Tractor	Drawbar Horsepower	Weight	Bucket Size	Dumping Height*
HD-5G	40	16,200 lb	1¼-2 yd	9 ft, ½ in
HD-9G	72	29,900 lb	2 -3¾ yd	11 ft, 4 in
HD-15G**	135	48,030 lb	3 -5½ yd	11 ft, 7 in
HD-20G	175**	63,325 lb	4 -7 yd	12 ft, 10 in

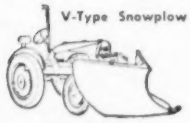
*Height of Bucket Hinge Pin
**Net engine hp — torque converter drive

WHEEL TRACTORS

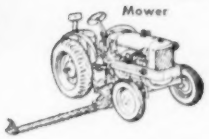


Sweeper

V-Type Snowplow

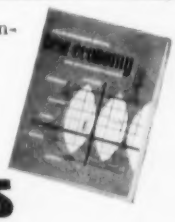


Mower



Speed handling and maintenance jobs with the IB Tractor. Highly maneuverable — only 8 ft long, 4½ ft wide, turns in 7-ft radius. Has unusual stability. Speeds up to 8.5 mph. Gasoline engine develops 18 hp. Attachments multiply usefulness.

SEND FOR YOUR COPY of "New Economy for Public Bodies" giving further information on this equipment — or see a nearby Allis-Chalmers Industrial Tractor Dealer in the well-established, nationwide organization.



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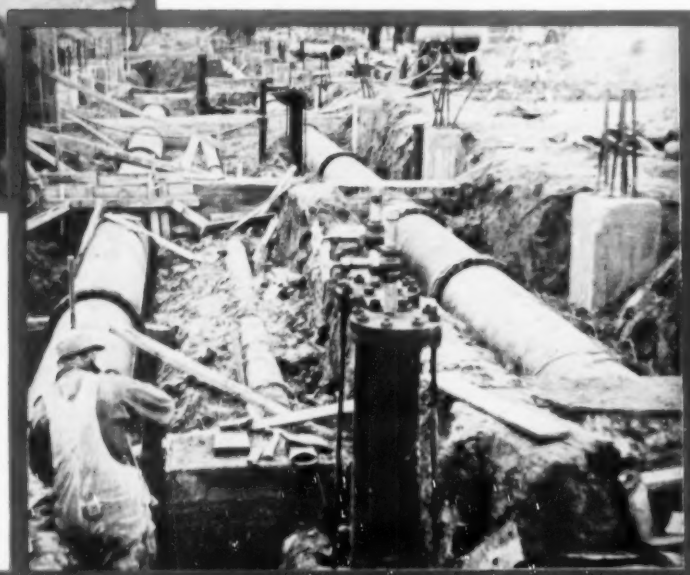
Used on jobs

When an installation, once completed, should be as trouble-proof as planning and materials can make it—engineers rely on cast iron pipe. It has high beam-strength, compressive-strength and shock-strength. Its effective resistance to corrosion ensures long life, underground or underwater. These are reasons why cast iron pipe is so widely used for water lines in tough terrain, pressure and outfall sewers, river crossings, and encased piping in sewage treatment and water filtration plants. For further information write: Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Ave., Chicago 3, Ill.



(above)
Cast iron mechanical joint pipe installed in connection with a new, larger sewage treatment plant at Rochester, Minn.

(at right)
Installing cast iron mechanical joint pipe used in air-conditioning system for Northland Shopping Center, Detroit, Mich.

CAST IRON PIPE

Now's the time to mail this month's Readers' Service card.

where long life is a "must"

(top right)
Installing large diameter cast iron pipe across Willamette River at Portland, Oregon for sewer line to interceptors and to new disposal plant.

(below)
Seven miles of 16-inch mechanical joint cast iron pipe installed for gas main in New Jersey.

(at right)
Installation of cast iron pipe for irrigation and sprinkling system for a Chicago park.

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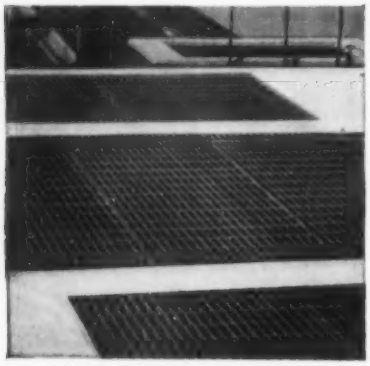

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UP FRONT FOR ADEQUATE ROADS

by
LEO J. RITTER, JR.

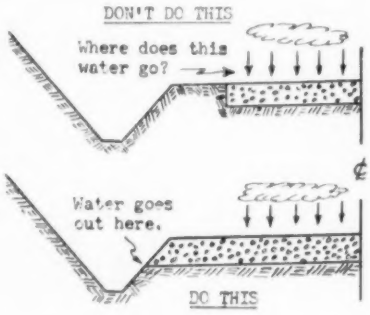
Sunshine Skyway — This month marks the realization of many dreams of Florida's West Coast citizens, with the opening of the $21-million "Sunshine Skyway", which links St. Petersburg with Bradenton, Manatee County, and points south. This gigantic structure spans 11 miles of water (Tampa Bay), saving 49 miles of travel by tortuous highways, putting the old Bee Line Ferry out of business, and opening up the agricultural and recreational wealth of Manatee County to the populous Tampa-St. Pete area. Designing engineers were Parsons, Brinckerhoff, Hall and McDonald of New York.

Gravelling Ditch to Ditch — Early last summer we fell heir to an assignment to discuss the topic "The Advantages of Gravelling Ditch to Ditch" before a group of local highway engineers. At first, we were puzzled as to what might possibly be said about this, assuming that there were some advantages; later, we became convinced that gravelling ditch to ditch not only has advantages, but is absolutely necessary to the proper design and functioning of gravel roads. Our reasons are as follows:

(1) Safety: Even on lightly traveled rural roads, safety is a prime requisite. An adequate shoulder is important to safety, particularly if the traveled way is less than 20 feet wide. Disastrous accidents frequently are caused, particularly at night, because disabled vehicles are forced to park on the roadway because of the lack of an adequate shoulder. Gravelling ditch to ditch provides an adequate, safe shoulder for emergency use.

(2) Drainage: From a design standpoint, this is of vital consequence. If the shoulder material is not free-draining, water that falls on the roadway can not escape and may be trapped in and beneath the gravel layer. This is particularly likely to happen if the shoulder is not adequately maintained, so that the shoulders are higher than the edges of the traveled way; a sort of "bowl" is thus created in which surface water is trapped. The water which can not escape may seriously weaken the subgrade, causing potholes and other failed areas to develop. In frost areas, the excess water may contribute to severe frost heave during the winter months and to severe damage in the spring, when thawing takes place.

These ideas are further emphasized by the sketches herewith:



(3) Capacity: The capacity of a road is markedly less with inadequate shoulders than it is with good wide shoulders. Capacity, of course, is the ability of a road to accommodate traffic with safety and convenience. Capacity of most gravel roads is not a major consideration, since they carry little traffic. However, in building for the future, building ample capacity into a road at the outset is highly desirable.

These are all points of consequence, it seems to us. Further, it must be noted that design of a road which is to have an impervious surface on a gravel or rock base is governed by similar considerations. It is essential that such a road be provided with wide, free-draining shoulders which are adequately maintained; shoulders may be provided by gravelling ditch to ditch.

here's why

TURBO JET has revolutionized leaf removal methods

★ Gets leaves out of all sorts of "hard-to-reach" places like shrubbery, fence corners, curbs and walls—even ivy and myrtle beds!

★ "Blower" action for drying out wet leaves permits pulverizing even immediately after rain!

★ Pulverizes leaves into a fine, granulated chaff that's next to invisible on lawns or planting beds—makes excellent, valuable mulch! Notice the result of pulverizing an average bushel of leaves as shown in the photo at left.

Look at these unique features:

★ Adjustable discharge air hood permits blowing chaff wherever needed—or it can be collected and bagged automatically for other use. Chaff deposited as mulch will not blow about as will whole leaves.

★ Sturdy, light, simple to operate—no skilled operators necessary. Low maintenance and operating costs. *No cutting blades* to sharpen!

★ Chaff and dirt blown away from operator and machine—no engine damage from pesky dust. On windy days, work *with* wind for best results.

★ NOT an "attachment"—Turbo Jet is *specifically* designed to do an efficient leaf removal job!

TURBO JET is more than a leaf pulverizer — Turbo Jet mechanizes the entire leaf removal task — picks up the leaves wherever they have naturally collected, returns them to the earth as a valuable, almost invisible mulch. Turbo Jet completely eliminates hand raking, gathering, burning, trucking of leaves. Through its novel "two-way action," Turbo Jet

(1) Cleans up leaves in its path through its intake opening, and

(2) Moves an even greater area of leaves into a windrow simultaneously through the blower action of its discharge air stream, enabling the operator to clear leaves from lawns in swaths up to 8 or 10 feet wide.

Utilizing this "two-way action" principle, the Turbo Jet can get leaves out of places inaccessible even to hand raking. Its amazing capacity for work permits one man with a Turbo Jet to do the work of a whole gang of men using rakes and trucks or mulcher-equipped power mowers. And that means MONEY SAVED — in many cases, enough in the first year to pay for the cost of the unit! Write today for folder describing Turbo Jet and its principle of operation.

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backfill problem

How Else Could You Do It?

IN JEFFERSONVILLE, INDIANA the E. H. Hughes Construction Co. had dug a 3′ wide trench for a lateral sewerline to a depth of 12′—in some places 15′—to tie in to an existing sewer main. This spoilbank along the edge of a built up residential street (hidden by spoilbank in photo) presented a real backfilling problem. Because the street had to be kept open to traffic and dust raising held to the minimum, the huge spoilbank could not be filled from the street side.

Hughes solved the backfilling problem—and at the same time compacted the filled trench—with a one-man-operated machine, the Cleveland Model 80-W. Needing minimum working space, easily able to pass under tree branches and clear all obstructions, the compact 80-W worked off the street, travelling parallel to the trench on the opposite side from the spoilbank. The street was kept open and the dust problem minimized.

The one-man 80-W did the complete filling and compacting job simultaneously as it travelled, cleaned up and left the job ready for immediate repaving. Its low ground pressure and perfect balance on wide full crawlers practically eliminated damage to the lawns, sidewalks and driveways it crossed.

Because of its unique versatility the Cleveland 80-W is saving owners time and money on a wide variety of pipelaying, trench filling and trench compaction jobs.

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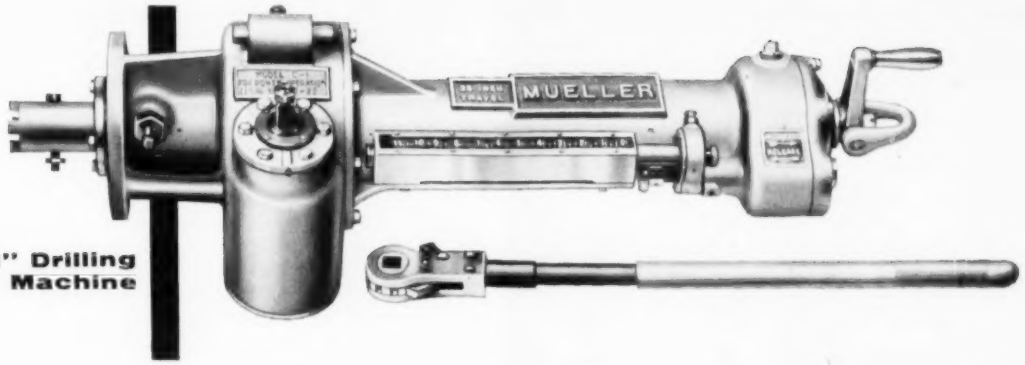
Personal Observations — We don't know who is responsible, but somebody should get an orchid for improving the movement of traffic through Baltimore. On a recent jaunt, we fairly breezed south through the city on U. S. 1 and on to the completed portion of the Baltimore-Washington Expressway. Looks like one more of the country's biggest traffic bottlenecks is well on the way to being removed. Also, we were much interested in the resurfacing project which is going on between Laurel Hill and Allegheny Tunnels on the Pennsylvania Turnpike; the new surface is asphaltic concrete reinforced with welded wire fabric.

Worthwhile — Two more publications have recently come to our attention; both are recommended reading. One of these is a book compiled by H. A. Radzikowski, Chief of the Division of Maintenance of the Bureau of Public Roads in Washington. It is called "Management of Mechanized Highway Maintenance" and is a masterpiece in its field. We don't know whether it is for sale or not; maybe you can drop Radz a line and ask him about it. The other publication is not a new one, but we ran across it again the other day. It is Bulletin No. 7 of the Engineering Experiment Station of the University of Idaho (Moscow), which is entitled "Maintenance of County and Rural Roads" and was written by J. C. Dalton. Maybe they still have a few copies left.

Materials Research — The August issue of *Public Roads*, the research journal of the Bureau of Public Roads, is devoted to discussions of the results of work by the physical research branch. Four topics are covered and all should be of interest to materials people. One of the articles is devoted to a report on the "Heat-Resistant Properties of Additives for Bituminous Materials". Another reports on "Properties of Concrete Containing a Blend of Portland Cement and Air-Entraining Ground Blast-Furnace Slag"; this one indicates that finely ground blast-furnace slag containing an air-entraining admixture can be used advantageously in concrete as a blend with non-air-entraining portland cement. Two of the articles deal with soil testing. One of particular practical significance is "A Comparison of Rapid Methods for the Determination of Liquid Limits of Soils". Two simplified methods, both of which are based upon one



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How a Sherman Power Digger Does More Work in Less Time with No Standby Equipment

Nearly every department in the city of Hopkins, Minnesota, finds a use for this versatile Sherman Power Digger.

The Water Department uses the machine when cutting off discontinued service lines at the main. They dig a hole in the street (usually blacktop) 3′ wide by 6′ long by 8′ deep. The hole must be plumbwalled for minimum replacement of paving. This operation used to tie up a truck all day, an air compressor half a day, and two men with hand tools, a full day.

Using a Sherman Power Digger, they now do *three* such jobs in one day, with only one man on the digger, no truck, and no compressor, except for concrete pavement. The job goes faster because they can dig the hole, shut off the line, and backfill before the walls begin to cave. Local soil conditions formerly required cribbing many of these excavations.

The city uses the Sherman Power Digger for routine maintenance and emergency repairs in other departments, too. Its compactness, speed and flexibility, along with low initial cost and economy of operation make it ideal for *any* municipality or department operating within a fixed budget. Write today for full details, without obligation. Ask for Bulletin No.

See the latest Sherman Power Digger at the APWA Convention — Booth No. A-60.

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determination of moisture and number of blows required to effect closure of the groove formed in the test, were evaluated and found to have sufficient accuracy, within limits, to be acceptable as alternates to the standard test procedure. Both methods are rapid and reduce testing time by as much as 30 to 70 percent. The final article reports "A Study of Dispersing Agents for Particle-Size Analysis of Soils"—among the best dispersing agents for U. S. soils were found to be sodium polyphosphate, sodium tripolyphosphate, sodium hexametaphosphate, and sodium tetraphosphate.

Calcium Chloride — A neat little booklet has been issued recently by the Calcium Chloride Institute, 909 Ring Building, Washington 6, D. C. on "Calcium Chloride in Concrete". This, and a flock of other publications, are free on request to the Institute.

Around and About — Chicago's new Grant Park underground parking garage, believed to be the largest in the world, was opened to the public on September 1; it has parking stalls for 2359 cars. All county trunk highways in Wisconsin will receive numerical "sufficiency ratings" by the end of the year through a plan worked out cooperatively by county and state officials. The transportation research program being sponsored jointly by the A and M College of Texas and the Texas Highway Department is blasting ahead under a full head of steam, with seven projects currently under way; T. H. MacDonald, former Commissioner of Public Roads, is leader of the program. Elmer Ward has been named Assistant Director of the Highway Research Board.

• • •

FIELD PRACTICE DATA BOOK

This is the second edition of Vol. 3 of this series of Data Books for Civil Engineers. This one treats of field practice and the duties of the field engineer or inspector. Part 1 covers inspection—concrete, masonry, structural steel, welding, metals, bridges, foundations, piles, wood construction, soils, bituminous paving and sewer construction. Part 2 covers surveying—stakeouts; circular, transition and vertical curves, earthwork computations, transit problems, mapping, etc. The arrangement is excellent and the information complete. By E. E. Seelye; John Wiley & Sons, Inc., New York; $7.50.

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Simply open the 2-section panels on both sides and the entire working mechanism is within easy reach. The 4-way single-spool valve controlling the packing jacks is mounted on the underbody hoist frame for accessibility.

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Only three hydraulic jacks for loading-packing-dumping. Completely automatic operation with one finger-tip control lever. Colectomatic mechanism operates only while loading, eliminating unproductive wear, and resultant maintenance.

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Low, wide loading sill reduces worker fatigue and permits two collectors to empty refuse at the same time. The hopper loading sill is the same height as the truck chassis longitudinals.

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Loading-packing mechanism is completely enclosed. Automatic safety door eliminates possibility of injury to crew or bystanders from flying glass, wood splinters, etc.

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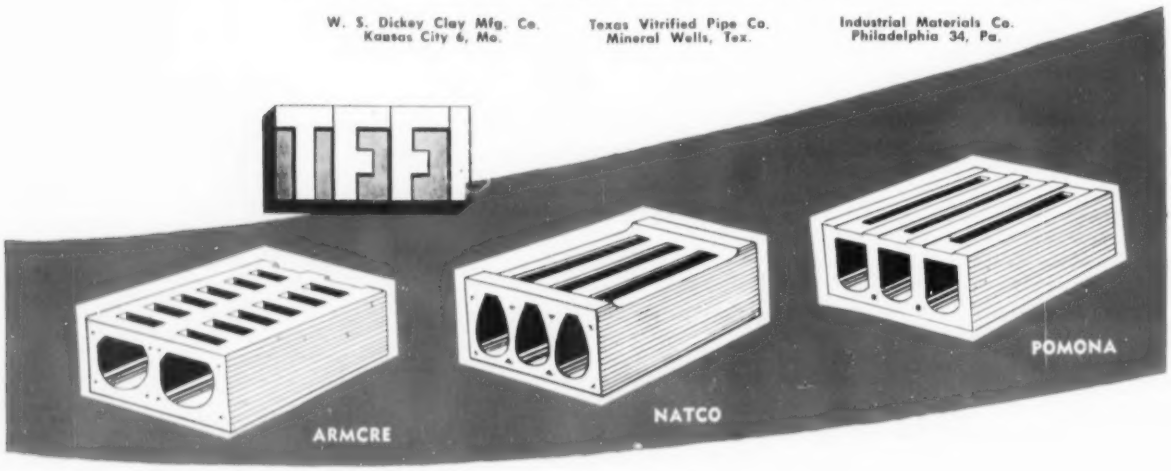

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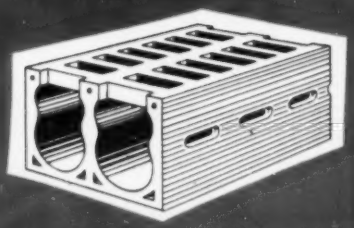

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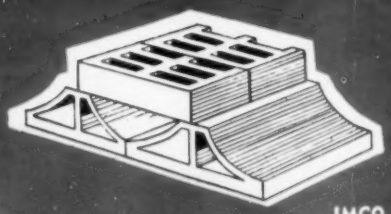

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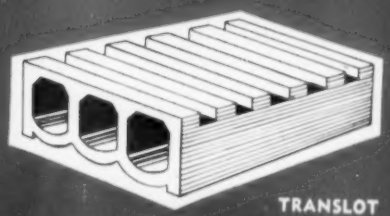

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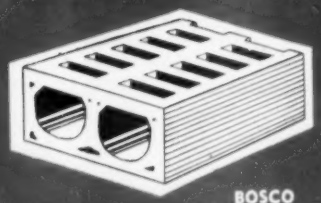
The best trickling filters use *vitrified clay filter bottom blocks.* We have just issued an enlarged and revised edition of this popular handbook. If you don't have one write for your copy today without obligation. Just address any member of the institute and it will be sent free of charge.



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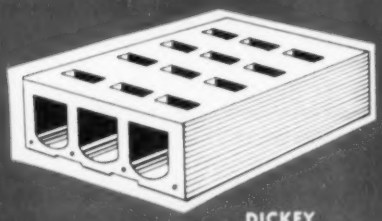

DICKEY

8 176-foot trickling filter units at Dallas, Texas, White Rock sewerage treatment plant, using Tex-Vit translot blocks. Consulting Engineers, Powell & Powell.

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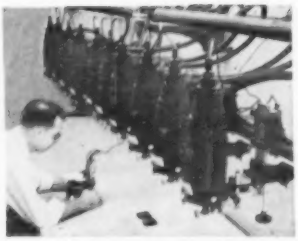

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These, as technicians will recognize at a glance, are the Multiplex—the Kelsh plotter and Swiss imported Wild A7 Autograph.

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Precise Maps for Cities — Highway Departments — Railroads — Power and Light
Oil and Mineral Exploration and Development — River Development and Irrigation — Etc.

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PHOTOGRAMMETRIC ENGINEERS, INC
BROADWAY AT TENTH SAN ANTONIO 5, TEXAS

AIR SURVEYS—MAPS

EASTERN OFFICE: Manhasset, N. Y., 32 Hillcrest, P. O. Box 411, Phone Manhasset 7-1840
WESTERN OFFICE: (Denver) Lakewood, Colo., 995 Flower St., Phone Bel. 3-2090

Now's the time to mail this month's Readers' Service card.

LETTERS TO THE EDITOR

BOX FOR TRENCH EXCAVATION

On pages 95 and 96 of your July, 1954, issue you carry an article describing a trench box used in the City of Marshfield, Wisconsin.

It appears to us that this trench box structure comes within the scope of the N. R. Shields Patent

Treaty excavating cage.

2,663,713 which is owned by Treaty Excavating Company.

Treaty Excavating Company is in position to issue license for the use and manufacturing of trench boxes or excavating cages according to their patent, and is also in position to manufacture and sell the trench boxes.

L. S. Fry
Treaty Excavating Company
Greenville, Ohio

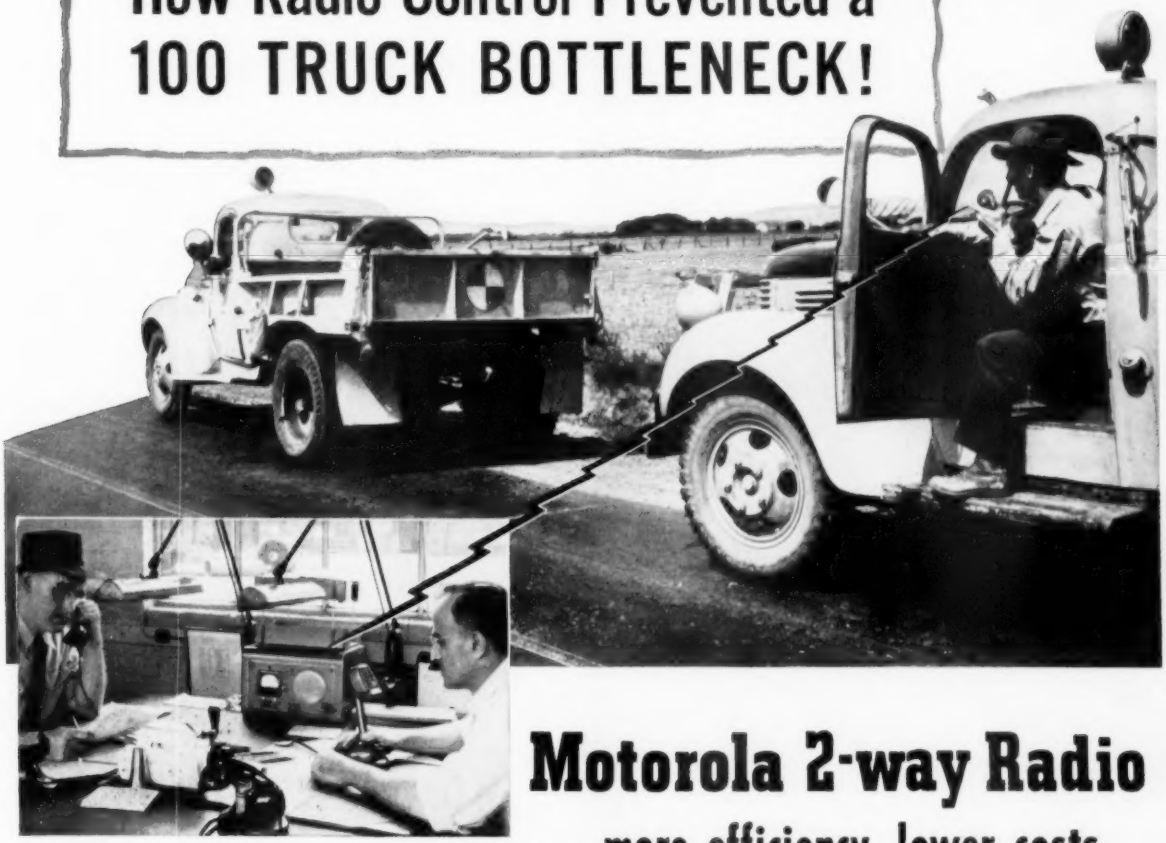
SPECIFICATIONS FOR MOTOR FUELS

We are interested in obtaining your help in attempting to establish a listing of gasolines and diesel fuels which are nationally advertised and have national reputation.

We find today, with all the additives and processing of these fuels, that a range of minimum and maximum points of a seasonal specification for gasoline and/or diesel fuels does not mean much in guaranteed performance in all types of highway equipment. There is no assurance of uniformity at all times which neces-

2-WAY RADIO IN ACTION—NO. 4

How Radio Control Prevented a 100 TRUCK BOTTLENECK!



Dispatcher at headquarters receives report of road-block along planned route . . . flashes word to trucks enroute.

Motorola 2-way Radio

. . . more efficiency, lower costs through radio communication

A close call with not a moment to lose!

Only Motorola 2-way radio on the alert supervisor's truck prevented a $1200 loss on the job.

As it turned out, the trucks were quickly rerouted—saving approximately 150 truck-hours (at $8.00 per unit per hour.)

That's only one instance. Here are other ways Motorola saves and pays: (1) Provides instant, pinpoint command of all operations, even in remote locations; (2) Permits quick solutions to emergencies of all kinds; (3) Facilitates materials handling and materials delivery; (4) Allows maximum, split-second flexibility; (5) Increases coordination and efficiency and decreases "lost time"; (6) Helps to do the job *better* and *faster . . . at lower cost!*

For the finest of equipment — backed by more than 25 years experience in mobile radio —plus the finest and strongest national service organization in the field, insist on Motorola 2-Way Radio!

national Motorola® RADIO COMMUNICATIONS service

Motorola Communications & Electronics, Inc.

A SUBSIDIARY OF MOTOROLA, INC

4501 W. Augusta, Chicago 51, Ill. • Rogers Majestic Electronics Ltd., Toronto, Canada

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

Lightweight Vise that's also a Work Bench... it's RIDGID Tristand

...with built-in folding tray

Stand and tray are all one unit—no loose parts. Quick easy set-up and take down. Extra-light weight but strong, rigid. Full size vise base—3 benders, ceiling brace screw, pipe rest, lots of tool slots. An unbeatable value—see it at your Supply House!

Tray pushes up easily to fold Tristand, pushes down easily to set up. Holds stand rigid.

Folds up for easy carrying to job and it's extra lightweight.

The Ridge Tool Company • Elyria, Ohio, U. S. A.

RIDGID Work-Saver Pipe Tools

Get full details of this month's products... mail your Readers' Service card today.

sitates costly adjustments of much of the equipment to obtain good operation; and questionable fuels may be accident producing due to unpredictable power failure in operation.

To insist on a nationally advertised product and with a national reputation and thereby reject all so called competitive products without such advertising and reputation is difficult unless there is some listing of recognized authority of such standard products and specific trade names.

If you can give us some suggestions on this matter it will be most appreciated and will provide assurance that the tax dollar is properly spent for best value in public safety and more efficient and economic operation of the many thousands of dollars invested in modern highway construction and maintenance equipment.

R. A. Smith,
Engineer,
Dane Co. Highway Dept.
Madison, Wisc.

BOOKS IN BRIEF

PARKING METERS

Bulletin 81 of the Highway Research Board consists of a study of the number, revenue and use of parking meters in the United States and Alaska, based on a comprehensive questionnaire returned by 1,167 municipalities. The project was a joint undertaking of the American Municipal Ass'n, the Highway Research Board, and the Bureau of Public Roads. 119 pps. Copies from Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. Price $1.35.

REFUSE COLLECTION AND DISPOSAL

This bibliography covers the period 1951-1953, and is a supplement to PHS Publication No. 91 which included references published during 1941-1950. The supplement is arranged in sections which correspond to the various administrative and operational phases of the broad field of refuse collection and disposal. It is intended as an aid in the exchange of information in both the research and operational phases of refuse-sanitation activities. It contains 39 pps., and copies can be obtained from U. S. Department of Health, Education and Welfare, Public Health Service, Washington 25, D. C. Ask for Publication No. 402.

we treat them all like

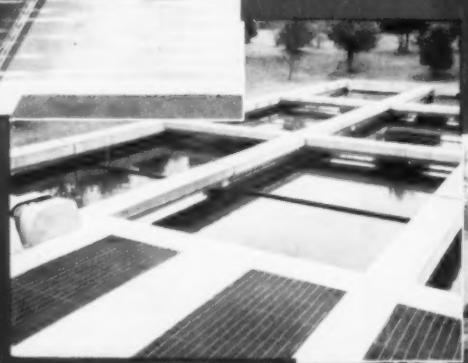
finger prints!

Just as no two sets of finger prints are ever alike, so, too, are all sewage and waste treatment problems *different.* Velocities, head loss, capacities, site conditions, tank or chamber hydraulic conditions, and many other factors vary from plant to plant. That is why we at Chain Belt have no standard answer to a treatment problem. We study each application carefully, and from our broad background of experience recommend the type and size of equipment you need for most efficient, economical results. From the broad range of Chain Belt Sewage and Waste Treatment Equipment, we select the exact units that can be best adapted to your particular conditions.

So, don't just specify equipment. Ask your nearest Rex Sales Engineer to work with you to assure the results you want, or write direct to Chain Belt Company, 4722 W. Greenfield Ave., Milwaukee 1, Wis.

Rex Mechanical Cleaned Bar Screens and Triturators

Rex Conveyor Sludge Collectors



Rex Grit Collectors

CHAIN BELT COMPANY

District Sales Offices in all principal cities

The new Delaware pool in the Town of Tonawanda, N. Y., is so popular that swimmers are admitted in shifts — 300 strong. Despite this heavy load, Adams filters keep the water glistening clean.

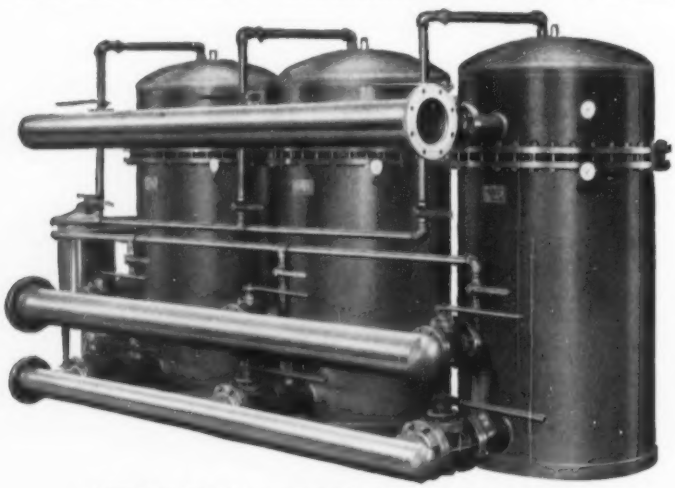
It's easy to keep your pool water Crystal Clear at Lower Costs

Hundreds of swimming pools across the nation have found that Adams filtration packages are the right answer. That's because of the advanced engineering design . . . diatomite filtration . . . permanent Poro-Stone elements . . . compact installation . . . simple operation featuring a new backwash technique.

We have a wide range of filters and delivery is prompt. You'll find the price of crystal clear water for your pool is amazingly low, so write for complete information, today.

ADAMS SPF...

TODAY'S FINEST SWIMMING POOL FILTER



Adams filter installation at Garfield Park Pool, Grand Rapids, Mich.

R. P. ADAMS Co., Inc. 228 EAST PARK DRIVE BUFFALO 17, N. Y.

Need more facts about advertised products? Mail your Readers' Service card now.

LEADERS IN PUBLIC WORKS

Harold B. Gotaas, who is Professor of Sanitary Engineering and Director of the Sanitary Engineering Research Laboratory at the University of California, is perhaps the most decorated man to appear on our front cover. Serving in the Sanitary Corps during the war (he entered as a captain and emerged as a colonel), he received the Legion of Merit; the Cross of Boyaca, Colombia; Order of Honor and Merit, Haiti; Order of Merit, Chile; and the Order of the Condor of the Andes, Bolivia. These awards were merely an indication of the remarkably fine job he did as Chief Engineer and finally President of the Institute of Inter-American Affairs, to which he was assigned in 1942 and with which he served until 1946.

Before going into the Army he had considerable experience in engineering work and in teaching, serving as Professor of Sanitary Engineering at the University of North Carolina at the time he entered the Army in 1942. He has a collection of degrees—BS from South Dakota; MS from Iowa State; SM from Harvard and ScD from Harvard; the two former are in civil engineering; the two latter in sanitary engineering. He is a member of ASCE, AWWA, APWA, FSIWA, American Society for Engineering Education and the Inter-American Society of Sanitary Engineers; and has served on committees and boards in all of these. In 1950 he was appointed a traveling fellow of the WHO, and he has spent some time on worldwide field work.

He and Mrs. (Alice McLaughlin) Gotaas have one son.

The Barber-Greene is easily adjusted to increase or decrease its normal laying width of 10 feet. Dual controls. Heated screed. Large receiving hopper. Complete thickness control of over-all width, center, or either side.

PAVE

PAVE profitably. **PAVE** with any mix, hot or cold.

PAVE with the tamper that compacts to uniform density.

PAVE with automatic leveling. **PAVE** with positive traction.

PAVE with permanent bond between strips.

Let us show you how the Barber-Greene Finisher can reduce your costs.

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Barber-Greene

AURORA, ILLINOIS, U.S.A.

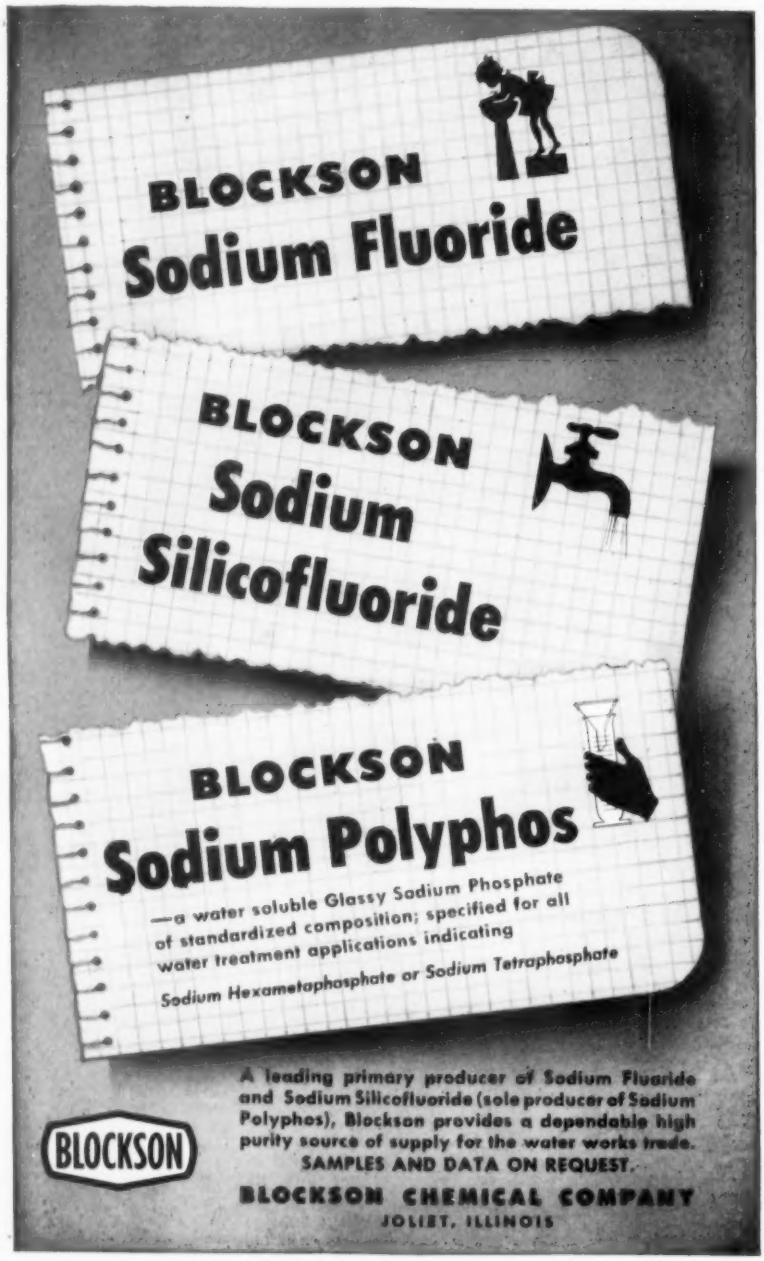
BG

WRITE for INFORMATION

descriptive literature . . . sound movies

cost studies . . . nearby job inspection . . . plant layouts

Now's the time to mail this month's Readers' Service card.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Sodium
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—a water soluble Glassy Sodium Phosphate of standardized composition; specified for all water treatment applications indicating
Sodium Hexametaphosphate or Sodium Tetraphosphate
A leading primary producer of Sodium Fluoride and Sodium Silicofluoride (sole producer of Sodium Polyphos), Blockson provides a dependable high purity source of supply for the water works trade.
SAMPLES AND DATA ON REQUEST.
BLOCKSON
BLOCKSON CHEMICAL COMPANY
JOLIET, ILLINOIS

How Many of These...

11 Attachments to the *Pit-Bull*

FIT INTO YOUR OPERATION?

Do you find something that you need? Chances are there are several. Maybe it's a machine that you have needed on occasional jobs, but you called in custom operators rather than invest in high-priced equipment.

Now, with the Davis *Pit-Bull* you can AFFORD your own! Why? Because the *Pit-Bull* is a high-quality unit with ELEVEN different attachment for low-cost versatility. You buy only the attachments you need without investing in a new power unit for each one.

Notice how all the attachments fit the same basic unit. They can be changed from one to the other in a matter of minutes. You save on labor costs, too, by letting one man and the *Pit-Bull* do a variety of work without having costly equipment sitting idle.

There's no sacrifice in performance either. The *Pit-Bull* converts your Ford or Ferguson tractor into a powerful industrial machine. Installation of syncro-mesh reversing transmission gives you greater maneuverability with four speeds in each direction, plus extra power for digging and loading. Reversal of the seating and steering controls lets you sit comfortably right over your work so you can see exactly what you're doing.

The Davis *Pit-Bull* is guaranteed to outperform conventional equipment pound for pound, dollar for dollar!

Check This List of Attachments:

1. Loader with or without Scarifier
2. Back-Hoe
3. Trencher
4. Rotary Broom
5. Swinging Crane
6. Lift Fork
7. Roller
8. Post Auger
9. Dozer
10. Hammer
11. Rotary Mower

Ask for a Demonstration!

Write for this Brochure On the Davis Pit-Bull and Ask for the Name of Your Nearest Dealer

MID-WESTERN INDUSTRIES, INC.

1009 SOUTH WEST STREET Dept. P. WICHITA, KANSAS

The Davis Pit-Bull Is Manufactured by the Makers of the Davis Loader, America's Quality Front-End Tractor Loader!

PB-5

Get full details of this month's products . . . mail your Readers' Service card today.

Take a *good* look

It's human instinct to look again at certain subjects.

It's human nature to *over*look those which lack instinctive interest.

Don't be the victim of a simple error — save a second look for your AIR RAID Warning System — it's not yet too late to reconsider.

Do you actually have an AIR RAID Warning System?

Is it completely effective?

Is it growing with the growth of your community?

A system adequate in planning, may have proved inadequate *in fact!* Growing requirements may have outdistanced *your* plan!

Other matters may have taken your attention, but few if any can be more important.

With this reminder fresh in your mind LOOK AGAIN!

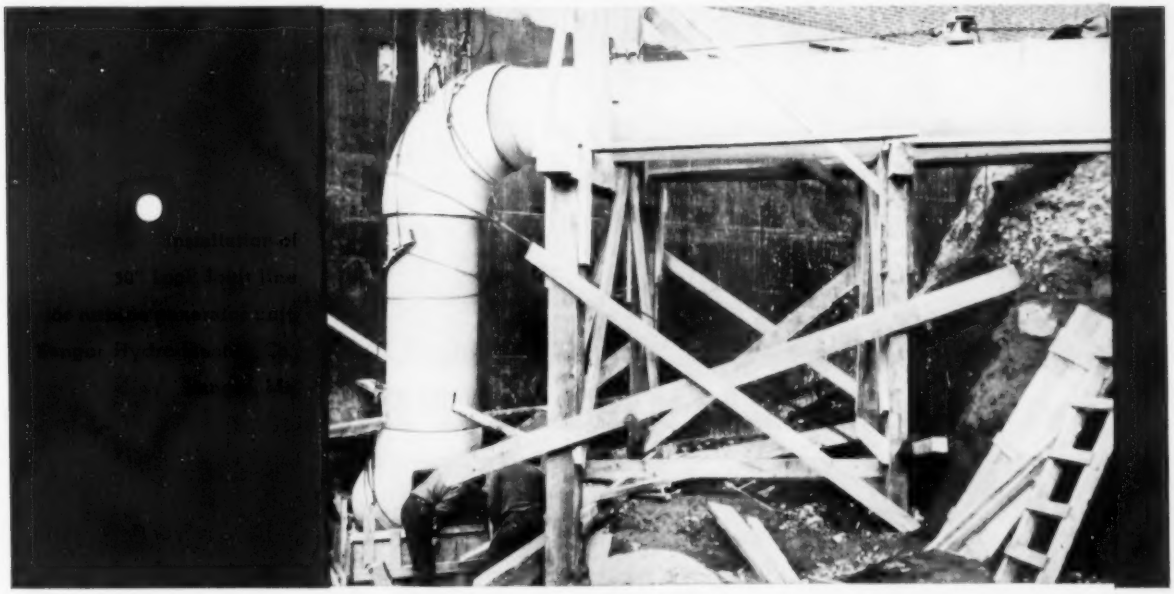
Let us help you with your AIR RAID requirements

FEDERAL SIGN and SIGNAL Corporation

Formerly: Federal Enterprises, Inc.

8733 S. State Street **Chicago 19, Illinois**

Thousands use our Readers' Service card to keep up to date . . . do you?



LOCK JOINT tailor-made pipe for industrial installations

When your industrial plant requires pressure pipe, are you faced with the problem of extensive plant alterations to accommodate the piping? Such difficulties can be greatly reduced by the use of Lock Joint Concrete Pressure Pipe because Lock Joint builds the pipe to fit your plant. Once your engineers have determined the precise lay-out desired, Lock Joint will furnish the pipe virtually tailor-made to your specifications for easy, accurate installation.

In addition, your Lock Joint pipe line will neither tuberculate nor corrode, will enjoy permanent high carrying capacity and will require practically no maintenance throughout its exceptionally long life. If your pressure pipe project calls for diameters of 16" or larger, whether for water supply, effluent lines, circulating or cooling systems, look to Lock Joint for the answer.

For many years a leading manufacturer of sewer and culvert pipe, Lock Joint also produces reinforced concrete pressure pipe for:

- DISTRIBUTION SYSTEMS
- SUBAQUEOUS INSTALLATIONS (Water intakes, sewer outfalls, river crossings)
- TRANSMISSION MAINS
- WATER WORKS OPERATION (Pumping and treatment plant piping)
- SEWER WORKS OPERATIONS (Force mains and treatment plant piping)

LOCK JOINT PIPE COMPANY

Established 1905

P. O. Box 269, East Orange, N. J.

PRESSURE PIPE PLANTS: Wharton, N. J., Turner, Kan., Detroit, Mich., Columbia, S. C.

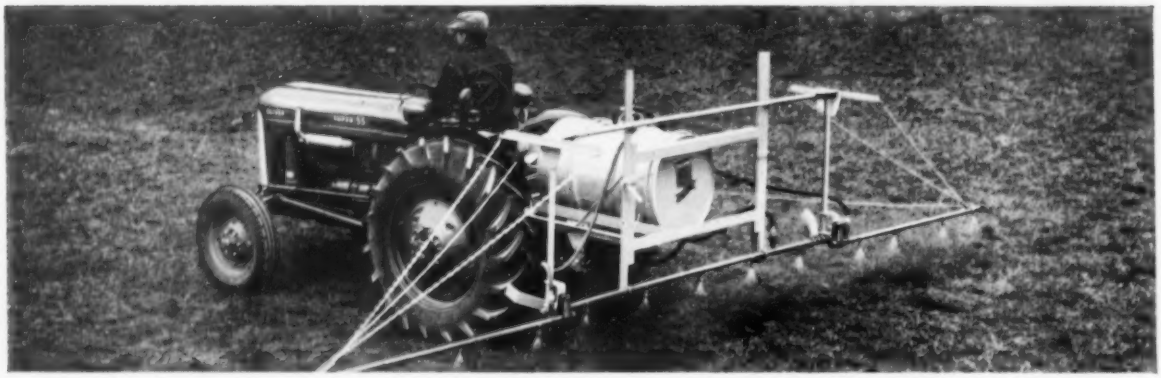
SEWER & CULVERT PIPE PLANTS:

Casper, Wyo. • Cheyenne, Wyo. • Denver, Col. • Kansas City, Mo. • Kennett Square, Pa. Valley Park, Mo. • Chicago, Ill. • Rock Island, Ill. • Wichita, Kan. • Kenilworth, N. J. Hartford, Conn. • North Haven, Conn. • Tucumcari, N. Mex. • Oklahoma City, Okla. • Tulsa, Okla. • Beloit, Wis. • Hato Rey, P. R. • Ponce, P. R. • Caracas, Venezuela • Wholly Owned Subsidiary, Great Lakes Concrete Pipe Co.: Buffalo, N. Y. • W. Henrietta, N. Y.

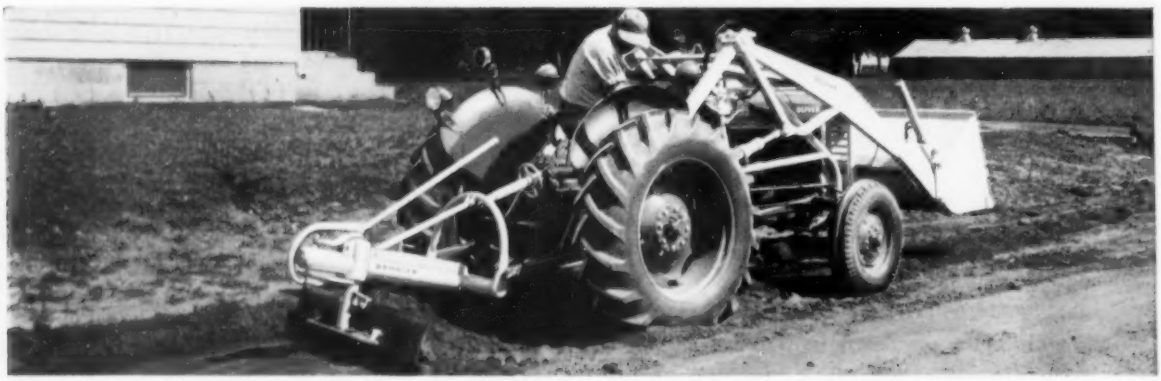
LOCK JOINT Reinforced Concrete PRESSURE PIPE

Need more facts about advertised products? Mail your Readers' Service card now.

New OLIVER SUPER 55 offers



built-in hydraulics for



Most powerful tractor of its type!

Two husky, overhead valve engines to choose from—diesel or gasoline. Pick the fuel that fits your needs the best, cuts your costs the most.

The diesel is a *full* diesel—starts and runs on diesel fuel alone. An engine rugged and responsive, and one that takes little fuel and upkeep. And this diesel is weatherproof—easy to start no matter what the weather or how long the tractor has been idle.

Choose the gasoline, and you get an engine built to the same rugged standards of the diesel. An engine with a compression ratio of 7.0 to 1—a new high for an industrial tractor! This extra high compression means greater power on less fuel, better performance on every job.

Now's the time to mail this month's Readers' Service card.

diesel or gasoline power...

all types mounted equipment

Mounts equipment front, rear, side!

The Super 55 is a tractor you can use with all types of equipment. Its 3-point hitch with built-in hydraulic system operates a variety of Oliver and other inexpensive tools. A sturdy, one-piece front frame with convenient mounting pad makes front mounted hydraulic pumps and other equipment easy to attach, easy to remove.

See this new Oliver, check its power, handling qualities and many attachments. Check, too, its many standard features: 6 forward speeds, double-disc brakes, recirculating ball-type steering—features that make the Super 55 the most versatile, profitable tractor you can own. See your Oliver Industrial Distributor, soon!

THE OLIVER CORPORATION
400 West Madison Street, Chicago 6, Illinois

a complete line of industrial wheel and crawler tractors

It's a fact... our handy Readers' Service card is the way to get new catalogs.

FREE EQUIPMENT DATA to Help Your PUBLIC WORKS PROGRAM

NEW LISTINGS

The engineering information in these helpful catalogs will aid you in your Engineering and Public Works programs. Just circle numbers you want on the coupon, sign and mail. This free Readers' Service is restricted to those actively engaged in the public works field.

Restoration and Protection Of Concrete Structures

385. A "How to Do It" bulletin describing the Thoro System for repair and sealing interior and exterior masonry surfaces is available from Standard Dry Wall Products, Inc., New Eagle, Pa., The treatment for every water problem is presented in illustrated case histories in this useful publication. Check the coupon for your copy.

The Stressteel Manual— A Prestressing Handbook

388. Truscon Steel Div. of Republic Steel Corp., Youngstown, Ohio, producer of Stressteel tensioning units has published a 24-page Manual including chapters on applications, design data, construction procedures and a picture story made on a typical prestressing job. To get a copy of this excellently prepared Manual check the coupon.

How to Eliminate Overhead In Sewer Cleaning Operations

389. Complete details of an equipment lending plan, with which a community can maintain its sewers adequately, without equipment and supervisional problems and usually at less cost than equipment upkeep is described in a handy brochure. Write Thomas Drain Service, 35 S. College St., Akron 8, Ohio, or check the coupon.

Design Data for Trickling Filter Underdrains

390. Full details and engineering data on Natco Unifilter blocks for trickling filter underdrains are offered in a 16-page booklet available from the Natco Corp., 327 Fifth Ave., Pittsburgh 22, Pa. Specifications, construction details and design data are included. Use the coupon today to get your copy.

Underdrains—Hidden But Important Filter Components

384. "Armcre" filter underdrain blocks are one-piece units made of vitrified salt-glazed clay. Ducts occupy 50% of floor cross section and air openings aggregate 24% of floor area. Described in several leaflets and data sheets available from Ayer-McCarel Clay Co., Brazil, Ind. Check the coupon.

Traffic-Actuated Controls For Every Intersection Problem

392. Traffic control systems which continually adjust to changing patterns to relieve congestion at every type of intersection are fully described in a comprehensive set of bulletins available from Automatic Signal Div., Eastern Industries, Inc., East Norwalk, Conn. Whether your problem involves side roads entering main arteries, complicated street intersections, speed controls or other situations, you will find helpful information in this literature. Check the coupon today.

Check These New Features On Refuse Collection Bodies

383. The all-new Heil "Colectomatic" refuse collection unit incorporates the best features suggested by municipal operating crews, supervisors and private operators to provide easy loading, simple operating mechanism, bulldozer type packing, fast dumping and many other important advantages. Check them all by getting attractive Bulletin BH-54103 from The Heil Co., 3044 W. Montana St., Milwaukee 1, Wis. Your copy is ready—just check the coupon.

All-Purpose Tractor Introduced by Oliver

391. Be sure to get full information on the Oliver Super 55 tractor, a new model designed to do every kind of municipal job. Takes all equipment, front, rear or side mounted; has built-in hydraulic system. Available with gasoline or diesel power. To get all the facts write The Oliver Corp., 400 W. Madison St., Chicago 6, Ill., or check the coupon.

E-Z Pack Body Offers Economical Refuse Collection

386. Simple, effective and trouble-free operation of the mechanical compaction mechanism featured by the Galion Allsteel "E-Z Pack" garbage and refuse collection body is fully described in a new two-color folder. Schematic diagrams, cutaway drawings, line sketches, action photos and all specifications are included. Investigate this unit now. Get Catalog L-9992 from Galion Allsteel Body Co., Galion, Ohio, or check the handy coupon.

Engineering Data on Incinerator Stokers

380. Incinerator stokers with hydraulic power drive are fully described in an attractive 8-page bulletin offered by Flynn & Emrick Co., Baltimore 2, Md. Detailed drawings and concise text show the operation of these units and point to the advantages of progressive burning for efficient disposal of refuse in an economical, nuisance-free manner. Check the coupon for Bulletin 1701.

Comprehensive Data on Lamps for Street Lighting

387. Complete technical data on lamps for street and highway lighting is given in an 8-page booklet, S-413, issued by the Lamp Div., Westinghouse Electric Corp., McArthur Ave., Bloomfield, N. J. Designed as a selection guide, the booklet presents information on all lamps in common use. Four special charts give data on mercury lamps and series and multiple lamp types. Check the coupon for this handy reference.

Data on Packaged Activated Sludge Plants

382. Packaged activated sludge plants designed to serve an equivalent population of 1000, 1500 and 2000 are described in technical bulletins released by Walker Process Equipment, Inc., 840 N. Russell, Aurora, Ill. Suggested plans and general specifications are included. Get Bulletin 22S79 by checking the coupon.

FOR MORE LISTINGS SEE PAGES 36 TO 50

Automatic Cutter Saws Cast Iron Pipe

393. This portable automatic pipe saw, available with either pneumatic or electric drive, makes fast precision cuts in 8-in. to 60-in. cast iron or steel pipe. Features are light weight, minimum clearance required, easy operation even when submerged. Get details from H. R. Prescott & Sons, Inc., Worcester, Mass., by checking the coupon.

Aluminum Bridge Railings Eliminate Maintenance

394. Attractive bridge railings combining strength, ease of fabrication and complete elimination of costly maintenance are described in "Bridge Railings of Alcoa Aluminum", a publication of the Aluminum Co. of America, Alcoa Bldg., Pittsburgh 19, Pa. Check the coupon to get this helpful brochure.

10-54

USE THIS COUPON to get detailed information on products and materials mentioned in this issue. Circle numbers below and mail today.

STOP READ AND SEND

Booklets from pages 34 to 50:

20	25	27	28	31	32	33	35	36	40
41	43	44	45	48	49	57	59	62	66
67	68	72	74	76	81	83	85	86	88
93	97	99	100	109	116	120	123	124	125
129	134	139	144	145	148	149	162	169	174
176	178	182	183	184	186	189	190	191	196
197	198	200	206	207	211	221	224	226	231
239	242	249	254	256	257	258	259	263	266
267	273	276	278	280	286	289	291	297	302
303	309	311	315	318	325	330	332	333	335
342	346	348	352	354	362	363	366	368	380
382	383	384	385	386	387	388	389	390	391
392	393	394							

New Products, pages 149 to 154:

10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8
10-9	10-10	10-11	10-12	10-13	10-14	10-15	
10-16	10-17	10-18	10-19	10-20	10-21	10-22	
10-23	10-24	10-25	10-26	10-27	10-28	10-29	

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Occupation .....

Street .....

City ..... State .....

NOT GOOD AFTER NOV. 15, 1954

MAIL THIS CARD NOW

You've never before seen Compaction like this!

Announcing the new and revolutionary

Buffalo-Springfield Kompactor

What do we mean by "new"? There's *never* been anything like it before!

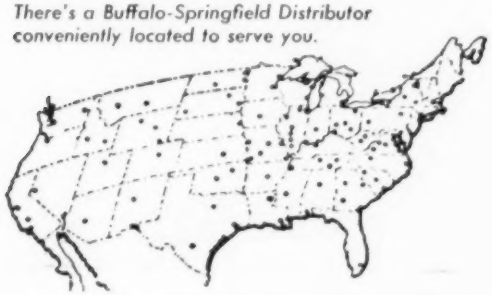
Why do we say "revolutionary"? Because the Kompactor is changing *drastically* the time and cost elements in soil compaction jobs!

Here are the spectacular results of tests in the field:

The Kompactor has met density requirements in one fourth the number of passes required with large sheepsfoot, vibrating, or heavy pneumatic-tired rollers. One contractor reports a cost savings of 50% on an embankment job!

The Kompactor is self-propelled, reversible, and easy to maneuver on steep embankments, can work in close to abutments, culverts, etc.

There's a Buffalo-Springfield Distributor conveniently located to serve you.



The unique rolls of the Kompactor are *segmented*. The staggered "islands" that form the rolling surface enter loose material with minimum displacement, either forward or horizontally. They leave without disturbing compacted areas in any way. All compaction effort is *downward*, resulting in greater and more uniform density from lower elevations to top surface. As a result, *two passes with the Kompactor will often meet density requirements!*

Before you bid another soil compaction job, find out more about the Buffalo-Springfield Kompactor. It may completely change your time and cost picture, give you a clear-cut advantage in bidding those close jobs!

Write today for full information.

The Buffalo-Springfield Roller Co.
Springfield, Ohio

BUFFALO SPRINGFIELD
THE STANDARD OF COMPARISON
SPRINGFIELD, OHIO

THE LEADER IN ROAD ROLLER DESIGN AND MANUFACTURE.

To order these helpful booklets, check the coupon on page 34.

WATER WORKS

Water Level Controls for Sewage and Water Plants

31. Dependable float-operated pump and motorized valve controls for single or multiple pump installations are described in bulletins issued by the Water Level Controls Div., Healy-Ruff Co., 719 Hampden Ave., St. Paul 4, Minn. All units feature splash proof construction, mercury tube switches.

The Modern, Streamlined Elevated Tank

32. An 8-page bulletin describes the Watersphere, a modern elevated water tank of welded steel construction for general service gravity water pressure and fire protection. Construction details, illustrations of typical installations and table of standard sizes from 25,000 to 250,000 gallons capacity are included. Check the coupon. Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 4, Ill.

Data on Cutting-In Valves, Repair Sleeves and Accessories

33. A variety of Clow products for installation and repair of cast iron pipe lines, including the Eddy cutting-in valve and sleeve, split sleeves for pipe repair, test plugs, valve boxes, Strickler pipe cutters and other fittings and accessories are featured in literature available from James B. Clow & Sons, Inc., Box 6600-A, Chicago 80, Ill. Check the coupon.

Meters and Instruments For Water Works

43. An attractively arranged 20-page booklet issued by Sparling Meter Co., Box 3277, Los Angeles 54, Calif., furnishes concise data on the full line of Sparling meters, indicator-totalizer-recorder instruments and other special instruments and controls. Check the coupon for your copy.

Technical Data on Fluorides And Other Chemicals

48. Technical data on fluorides and other chemicals will be found in a comprehensive booklet issued by Blockson Chemical Co., Joliet, Ill. This helpful 60-page booklet includes a great deal of general information of value to water works men. Get a copy by checking the coupon.

Helpful Data on Water Works Products

49. A completely new catalog covering the entire line of water distribution and service products offered by the Mueller Company, of Decatur, Ill., is now available to engineers and water works superintendents. The 328-page catalog features an easy-to-use sectional indexing arrangement to facilitate quick reference to any of the hundreds of products listed. A large section of useful engineering information is included. Check the coupon today.

Engineering Data on Disc Feeder for Dry Materials

57. The Omega Model 50 Disc Feeder for accurate and continuous feeding of dry materials at low rates is described in Bulletin 50-B57, issued by Omega Machine Co., 545 Harris Ave., Providence, R. I. Adjustable in feed range from 20 to 1700 cu. in. per hour, this self contained, readily portable unit finds wide application in feeding practically any granular or powdered dry material. Get full data by checking the coupon.

Meter Features That Help Make Water Works Profitable

59. Simple design, accuracy and long life, moderate first cost and inexpensive maintenance are features of American water meters described in Bulletin No. 50 of the Buffalo Meter Co., 2917 Main St., Buffalo 14, N. Y. Be sure you have this informative booklet which gives the details of American meter design and construction plus full data on sizes, capacities and dimensions. Get your copy by checking the coupon.

For Fast, Smooth Pipe Cuts

68. Descriptive literature on the Reed 4-wheel hinged pipe cutter which operates in close quarters, gives quick, easy right-angle cuts, is available from Reed Mfg. Co., Erie, Pa. Check the coupon.

Convenient Reference Manual Covers Cast Iron Pipe, Valves and Hydrants

76. An 80-page manual, issued by R. D. Wood Co. Independence Sq., Philadelphia 5, Pa., presents specifications for "Sand-Spun" cast iron pipe and fittings, outlines types of joints available, lists dimensions and weights in convenient tables and includes, in addition, full engineering data on the Mathews fire hydrant and R. D. Wood gate valves. Check the coupon for this useful information.

Engineering Facts About Transite Pipe

83. This compilation of Johns-Manville's "Engineering Facts" series presents concise, factual information about Transite's many economic and engineering advantages, and includes informative case histories plus dimensions and data for your files. Write Johns-Manville, Box 290, New York 16, N. Y., or use the handy coupon.

Engineering Data on Diatomite Filters

139. Get complete data on the Sparkler model SC-J diatomite slurry feed filter for swimming pools from the Sparkler Mfg. Co., Mundelein, Ill. Check the coupon for full information including table of filter sizes and capacities, space required and filter operation.

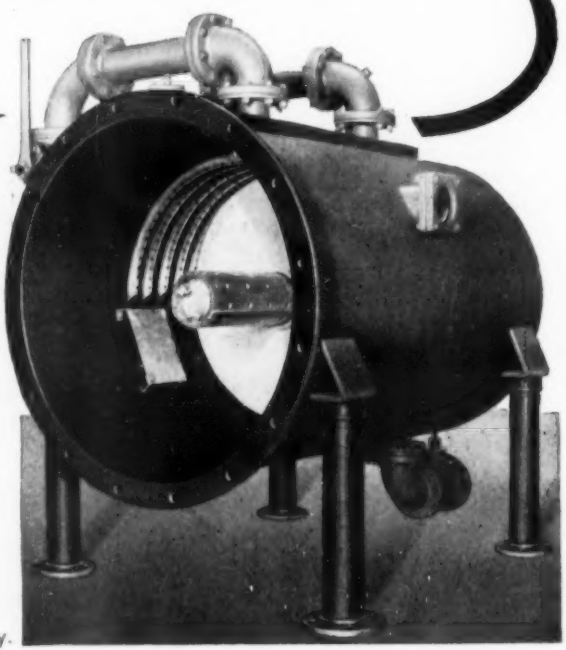
Efficient Underdrains for Rapid Sand Filters

239. Be sure you have engineering data on vitrified clay underdrains, efficiently designed for filtering and backwashing. Check the coupon or write F. B. Leopold Co., Inc., Dept. PW, 2413 W. Carlson St., Pittsburgh 4, Pa.

A new trend in municipal water filtration —

The SPARKLER DIATOMITE FILTER MODEL SCJ

has been highly successful in installations now in operation



Reduced operating cost due to long filtering cycles and fast backwash cleaning, together with a remarkably low bacteria count requiring a minimum of chlorination are features that make this new type filter worthy of the attention of all waterworks engineers.

Practically any volume of city water can be filtered economically in the Sparkler SCJ filter. Single units capable of handling 5,000,000 gallons of water a day are available. Multiple units can be engineered into a system for larger requirements.

Less than 0.2% of water is required to backwash and clean the largest filter units and a complete fresh precoat of diatomite can be applied and the filter ready to resume operation in 15 minutes.

Operators can be easily trained, no highly skilled specialized personnel is required to insure efficient performance.

Write for plans and prices on your requirements. Address Dan Baldwin for personal service.

SPARKLER MANUFACTURING CO.

Home office and plant, Mundelein, Ill.

EUROPEAN PLANT
Prinsengracht 876
Amsterdam, Holland

CANADIAN PLANT
Galt, Ontario

Manufacturers of industrial filters for over a quarter of a century.

DELIVERS WATER CHEAPER

Philadelphia Dresser-Couples 2-mile steel main in expanding program of general waterworks improvement.

In adding to many miles of Dresser-Coupled steel mains laid since the War, Philadelphia engineers again recognized the outstanding advantages of this type of construction. These twin steel lines meet the needs of central and southern Philadelphia.

Dresser-Coupled steel mains are a sound investment. The beam strength of steel pipe, plus the non-rigidity of both pipe and couplings, assures a husky, flexible, permanently tight line. Glass-smooth linings sustain high carrying capacity. Dresser-Coupled installations fit in well with existing structures . . . are readily adaptable for future changes.

Actual installation is fast and relatively simple. Lighter weight steel pipe is easier to handle. Long pipe lengths mean fewer joints. Small crews, with a minimum of skill, supervision and heavy equipment, make joints faster, surer. The result—lower cost, maintenance-free lines.

BE SURE **you get the *best* line at the *best* price. Always put steel pipe and Dresser Couplings in *your* specifications.**

DRESSER® COUPLINGS

Dresser Manufacturing Division, 69 Fisher Ave., Bradford, Pa. (One of the Dresser Industries). Warehouses: 1121 Rothwell St., Houston, Texas; 101 S. Airport Boulevard, South San Francisco, California. Sales Offices: New York, Philadelphia, Chicago, Houston, South San Francisco. In Canada: Toronto, Ontario.

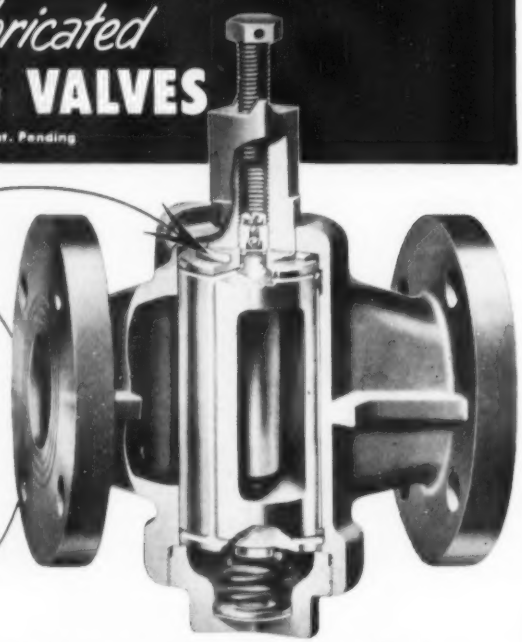
Now's the time to mail this month's Readers' Service card.

To order these helpful booklets, check the coupon on page 34.

No. 1* of . . .

12 REASONS WHY
YOU SHOULD BUY AND USE
LOW-PRICED

HOMESTEAD
Lubricated
PLUG VALVES
Pat. Pending



* EVERY HOMESTEAD LUBRICATED PLUG VALVE HAS A REINFORCED TEPLON HEAD SEAL

. . . which will not cold-flow, and which provides a positive seal against leakage—even under 200 pounds pressure per square inch, *without lubrication*.

This is only **ONE REASON WHY** you should buy and use, *low priced* **HOMESTEAD LUBRICATED PLUG VALVES.**

HERE ARE ALL TWELVE

1. Reinforced Teflon head seal.
2. Completely controlled high-pressure lubricant system.
3. 100% pipe area or venturi patterns.
4. No spring torsional stress.
5. No mechanical adjustments.
6. Two lubricants handle most services.
7. Extremely close tolerance between sealing surfaces.
8. Triple head seal.
9. Plug floated on Teflon washer.
10. Leak-proof double-ball and Lubricant-sealed check valve.
11. Full-threaded screw assures clean lubricant.
12. Extruding lubricant shows when system is full.

Without obligation, send REFERENCE Book 39—Section 5 on HOMESTEAD Lubricated PLUG VALVES.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

HOMESTEAD VALVE MANUFACTURING COMPANY
Serving Since 1892

P. O. BOX 40 CORAOPOLIS, PA.

Get full details of this month's products . . . mail your Readers' Service card today.

Dependable Source For All Chlorine Products

66. Get latest data on Jones chlorine service for liquid chlorine, calcium hypochlorite and sodium hypochlorite packaged in lots best suited for your needs. Five strategic locations serve all parts of the country. Check the coupon or write John Wiley Jones Co., Caledonia, N. Y.

Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves are contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., Eliot Street, Fairfield Conn.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Discussion of Ranney Method For Municipal Water Production

116. A very interesting study of municipal and industrial water supply problems and a complete discussion of Ranney Collectors for water production will be found in a 20-page booklet published by Ranney Method Water Supplies, Inc., Box 277, Columbus 9, Ohio. Water quality, construction methods, costs, performance and other topics are considered. Check the coupon to get your copy.

Pipe Detector Determines Exact Location and Depth

120. Determination of the exact location and depth of buried pipes, valves, service cables and other metallic objects can save costly digging and unnecessary damage. Your work can be speeded when you use the Detectron pipe detector, which features simple operation, shielding to avoid static interference, economical unit construction and a lifetime guarantee. Get full data from Detectron Co., 5631 Cahuenga Blvd., No. Hollywood, Calif., by using the coupon.

Pollution-Proof Outdoor Drinking Fountain

144. An outdoor drinking fountain so designed that contamination by cross connections or back siphonage is not possible is fully described in a 4-page bulletin. Features neat appearance, easy installation. Write Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati 2, Ohio, or use coupon.

Faster Pipe Laying With Precaulked and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precaulked bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

All-Electric Floatless Liquid Level Control

174. Description of operating principles and application of B/W controls show the simplicity and many uses of these all-electric, floatless devices. Get latest bulletins for engineering data, diagrams of typical installations and details of component parts. Check the coupon or write B/W Controller Corp., Dept. PW, Birmingham, Mich.

Non-Clogging Vertical Wet-Pit Pump Described

182. Full engineering data on Worthington "Freeflo" wet-pit pumps with non-clogging impellers capable of passing solids and stringy material are included in Bulletin W-317-B12. Check these pumps for sump, sewage and drainage service. Bulletin available from Worthington Corp., Harrison, N. J. Just use the coupon.

Data on the Ratochlor Chlorine Dispenser

134. Complete descriptive literature on Ratochlor chlorinators which feature corrosion resistance, safety, dependability and direct, visible flow measurement is available from Fischer & Porter Co., Hatboro, Pa. Details of operation, applications and full engineering data are furnished. Write today or check the coupon for latest information.

Engineering Data On Mechanical Joint C.I. Pipe

183. General specification, weights and dimensions of mechanical joint cast iron pipe and fittings are furnished in a 32-page booklet issued by Alabama Pipe Co., Anniston, Ala. Get this helpful data by checking coupon.

Locate Mains, Services and Leaks Without Digging

186. A 16-page booklet tells how to use the Fisher "M-Scope" to locate buried pipes, cables, valves, manhole covers, conductive and non-conductive sewer pipes and septic tanks by electronic means. Dry battery operated. Only one man is needed for operation. Get data from Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif., by checking the coupon.

Assistance in Planning Electrical Systems

189. On every water and sewage plant expansion, modernization or new construction job, you can get valuable assistance in planning the electrical system from Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. Be sure to investigate compact, unitized Westinghouse equipment which conserves building space and simplifies maintenance. Check the coupon for full data.

Engineering Data on Tilting Disc Check Valves

196. The Chapman tilting disc check valve is designed to lift away from the body seat without sliding or wearing; closes without slamming. Operating principles, details of construction, dimensions, recommendations and engineering data are fully covered in 18-page Bulletin No. 30. Get your copy by checking the coupon or write to Chapman Valve Mfg. Co., Indian Orchard, Mass.

What You Should Know About The Centriline Process

197. The Centriline method for cement mortar lining water mains 16" thru 144" in place to stop leaks, prevent corrosion, increase carrying capacity and decrease pumping costs is fully described in a handsome booklet issued by the Centriline Corp., 140 Cedar St., New York 6, N. Y. Many illustrations and typical case histories show the operation and economies of this process. The Tate process for lining smaller mains is also covered. Check coupon for your copy.

Complete Catalog and Reference Data on Valves and Fittings

211. The entire M & H line of valves, fittings and accessories for water works, filtration sewage disposal and fire protection are illustrated and fully detailed in Catalog 52 issued by M & H Valve & Fittings Co., Anniston, Ala. In addition to complete data on these products, there are many pages devoted to helpful engineering data. Every designer should have a copy. Get yours by checking the coupon.

Investigate This Compact Flow Meter for Water

226. The Foster "Flow Tube" is a metering element that is compact and easy to install. Bulletin FT illustrates simple element containing nozzles for differential pressure production and shows capacity range and accuracy. Made in standard type sizes. Foster Engineering Co., Union, N. J. will send copy, or use coupon.

Helpful Data On Valve Boxes

291. Bulletin 35 issued by Buffalo Pipe & Foundry Co., Box 55, Sta. B., Buffalo, N. Y., gives full details on adjustable valve boxes, extension boxes and roadway boxes for water and gas. Get your copy by checking the coupon.

Reference Catalog for Valves, Fittings and Hydrants

125. Complete data on gate valves for all services, operating accessories, check valves, fire hydrants and related specialties plus a reference section of useful engineering data is contained in Catalog H-1 issued by Rensselaer Valve Co., Troy, N. Y. All engineers who specify valves, fittings, and hydrants should have this valuable catalog for ready reference. Check the coupon.

Manual Covers All Types Of Pipe and Service Repairs

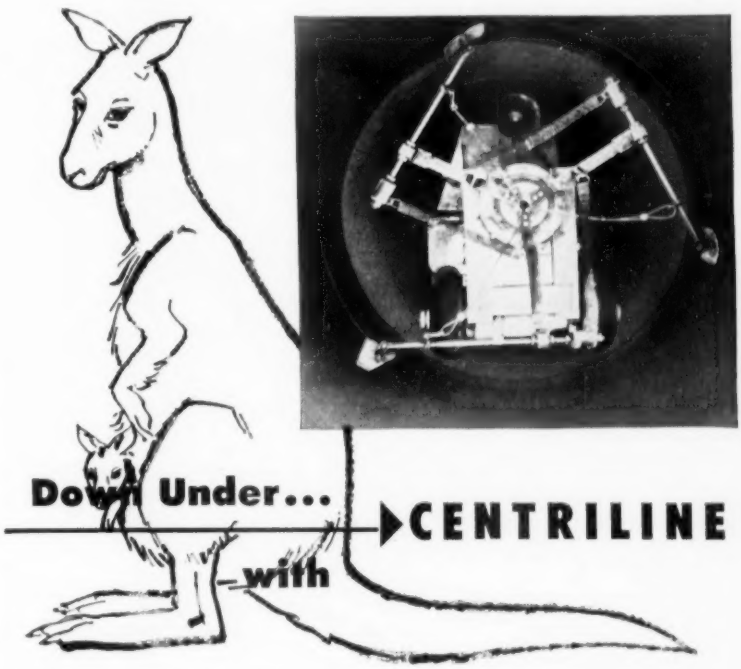
266. Full details on the entire line of Skinner-Seal pipe repair clamps, service fittings and drilling equipment are presented in a new catalog and service manual offered by the M. B. Skinner Co., South Bend, Ind. Step-by-step installation pictures and captions give clear, concise instructions for the repair of all types of pipe leaks. Get helpful Catalog GW by checking the coupon.

Water Conditioning Data Book Offered To Engineers

259. All engineers and municipal officials concerned with water conditioning will want a copy of the greatly enlarged edition of the popular Permutit Data Book prepared by the Permutit Co., 330 West 42nd St., New York 36, N. Y. This completely revised book presents a compilation of 78 tables, all valuable to the engineer. Subjects include hydraulics, impurities in water, reactions and conversions of chemicals used in water treatment, alkalinity relationships and other helpful material.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in a convenient booklet offered with the compliments of U. S. Pipe and Foundry Co., Birmingham 2, Ala. Get your copy by checking the coupon.



In two of Australia's important cities, Centriline is currently playing a major role in the rejuvenation of water systems. The Metropolitan Water Sewerage and Drainage Board of Sydney, within the next five years, will Centriline approximately 60 miles of its water mains, 30" to 48" in diameter. In a suburb of Melbourne, the Hunter Water District has turned to Centriline for the cement-mortar lining of over 19,000 feet of 36" steel pipe.

Both of these Australian municipalities, like hundreds of others in the United States, have selected this process because they know that Centriline means absolutely no tuberculation or corrosion . . . lower pumping costs . . . higher carrying capacity . . . new pipe life . . . and no excavation and traffic tie-up. (The Centriline machine runs through the pipes while pipes remain in-place.) Add decades to the life of *your* water system—call on Centriline.

3,500,000 FEET OF EXPERIENCE

CEMENT-MORTAR LINING OF PIPES IN PLACE

CENTRILINE CORPORATION

A subsidiary of Raymond Concrete Pile Co.

140 CEDAR STREET • NEW YORK 6, N.Y.

Branch Offices in Principal Cities of United States and Latin America

To order these helpful booklets, check the coupon on page 34.

Since 1938 . . .

A PROVEN PROCESS

for economical, simple sewage treatment

Hays Submerged Contact Aeration

for SMALL CITIES, SUBDIVISIONS, INSTITUTIONS

City of Big Spring, Texas. Design: 20,000 population, 80 gallons per capita, 0.17 lb B.O.D. with additional capacity for certain industrial wastes.

8 OUTSTANDING ADVANTAGES of which

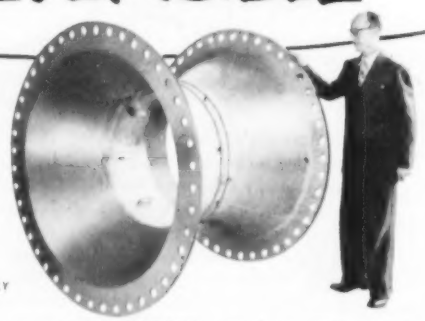
6 *No suspended solids.* The contact media and biological growth are stationary, and are not dependent on suspended biological solids which can be "washed out" and lost in the effluent.

The 2 other big advantages are being told in other ads—or

For fully descriptive literature Engineers are invited to address:

HAYS PROCESS COMPANY P. O. Box 768, Waco, Texas

it's REVERSIBLE



The *Gentile** **FLOW TUBE** measures flow in either direction

*GEN-TILE-LY

REVERSIBLE . . . The Flow Tube is symmetrical, with upstream and downstream ports identical. When the flow is reversed, the differential is reversed. Permits metering reverse flow at lowest possible equipment cost.

LOW INSTALLED COST . . . Average length is only 1½ times the pipe diameter, and straight runs entering and following are not required unless installed near throttling valves or regulators.

ACCURACY . . . Produces differential from points of equal cross-sectional area . . . furnished with head capacity curves, and guaranteed for exceptional accuracy when used with any standard indicating, recording or integrating meter.

LOWEST HEAD LOSS . The Flow Tube can be designed to produce a measurable differential with the lowest permanent pressure loss of any type head meter.

Write for Bulletin FT-101, or for specific recommendations.

FOSTER ENGINEERING COMPANY

835 LEHIGH AVENUE UNION, N. J.

AUTOMATIC VALVES • SAFETY VALVES • FLOW TUBES

Thousands use our Readers' Service card to keep up to date . . . do you?

New Advantages In Boiler Construction

309. Get the latest data on cost-saving tube-supported wall enclosures for large and small boilers from Bigelow-Liptak Corp., 2550 W. Grand Ave., Detroit 8, Mich. 12-page booklet gives full details. Check the coupon today.

Trencher Fits Municipal Needs

315. A bulletin describing the Cleveland Model 95 trencher has been published by the Cleveland Trencher Co., Cleveland 17, Ohio. The Model 95, called "The standard machine for city and suburban work", is versatile, maneuverable and economical for use on water lines, service lines, road widening and all utilities trenching. Get this 8-page illustrated bulletin by checking the coupon.

Helpful Data on Water Meters

330. It is to the interest of every water works superintendent and engineer to have full data on dependable Badger water meters and related meter products. Complete data on all types of disc, turbine and compound meters, meter test equipment, yokes, strainers and alarm registers are supplied in an attractive binder by Badger Meter Mfg. Co., Milwaukee 45, Wis. Check the coupon for your copy.

Job Data Offered on New Steel Water Mains

342. A 16-page illustrated report listing construction details on steel water lines is entitled "Dresser Coupled Steel Water Lines in the Year 1952." Get your copy from Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa. by checking the coupon.

Controller Maintains Water Level In Treatment Basins

348. Instrumentation which maintains liquid level in sedimentation basins, and thus controls level in succeeding treatment basins, is described in Application Engineering Data Sheet No. 831-20, issued by The Foxboro Co., Foxboro, Mass. All components are described in the illustrated data sheet. Get your copy by checking the coupon.

Semi-Automatic Control For Filter Backwashing

354. Developed to save cost and time, relieve plant personnel and insure accurate backwash rates for maximum filter efficiency, the Builders-Providence "Auto Central Filter Control" system carries out the backwash cycle and returns the filter to service automatically. Full information on this flexible system is clearly presented in Bulletin 480-L1. Write Builders-Providence, Inc., 345 Harris Ave., Providence, R. I., or check the coupon.

Two-Way Radio Equipment For All Departments

363. The benefits of two-way radio communication in the uncongested non-interference 450-megacycle range make full information on this subject important to all engineers. Get full data on trouble-free systems from Motorola, Inc., Dept. PW, 4545 Augusta Blvd., Chicago 51, Ill. Just check the coupon.

How Your Filter Washing Can Be Improved

368. More effective sand washing with elimination of mud balls and bed cracking with resultant longer filter runs are claimed for the Palmer Filter Bed Agitator, described in bulletins issued by Palmer Filter Equipment Co., Erie, Pa. Get latest data by checking the coupon.

●

SEWERAGE AND WASTE TREATMENT

Packaged Sewage Treatment— Just Right for Small Places

36. "Packaged" Sewage Treatment Plants specifically developed for small communities—100 to 3,000-population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 622 Diversey Pkwy., Chicago 14, Ill.

Armco Liner Plate is installed as failing monolithic sewer is removed ahead of it.

Solve Failing Sewer Troubles ...For Good

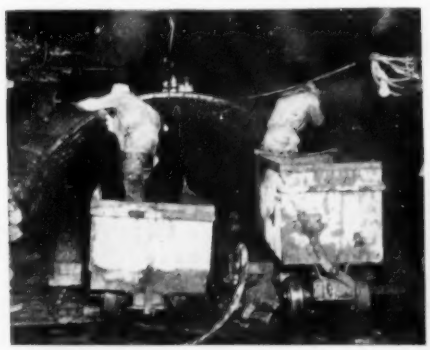
You can restore failing sewers and add years of trouble-free service with Armco Liner Plate.

These corrugated metal plates are quick and easy to install. There is no danger of disjointing or malalignment. And the restored structure has ample strength to resist loads without crushing or cracking.

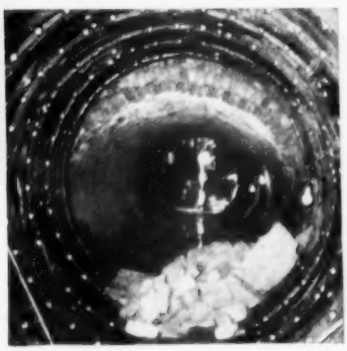
Armco Liner Plate is installed from inside the sewer. The plates are bolted together along two flanged sides to form a ring of uniform strength. One or two men can readily carry, hold and bolt individual plates into place. Work goes quickly with a small crew.

Armco Liner Plates are made in a wide range of sizes and gages to meet specific needs. They are available in elliptical shapes and arches, as well as full round structures. Write us for complete Liner Plate information. Also ask about other Armco Structures for saving failing sewers. There's a size and type for almost every need. Armco Drainage & Metal Products, Inc., 3994 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

This monolithic box sewer gets new life with Armco Liner Plate. The void between the new and old is grouted to prevent settlement.



ARMCO LINER PLATE



ARMCO

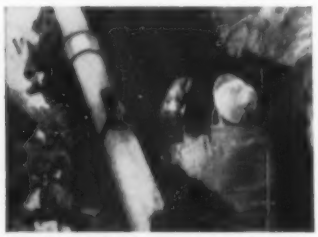
Armco Liner Plate was the answer when the top of this sewer sagged.

Question:

Can we get installation savings and performance too?

Answer:

Yes...with the new Ring-Tite Coupling



On this Utah job, snow, ice and difficult conditions caused no installation slowdown.

In this California installation, flexible Ring-Tite joints permitted easy conformance to curves.

Speeds assembly of Transite Pressure Pipe

In state after state, contractors are learning that Transite® Pressure Pipe and the new Ring-Tite® Coupling provide fast, sure pipe line assembly with tight, dependable joints . . . strength to assure lasting, trouble-free water mains through the years.

With Ring-Tite, installation costs less—assembly follows digger closely. Typical contractors' comments: "On entire job, trencher and backfiller seldom over 150 feet apart . . ." "Laid 6" Class 150 Ring-Tite at a rate of 5000 feet per 8 hours."

The design of the Ring-Tite Coupling permits quick, easy alignment. To assemble, rubber rings are simply popped into grooves. Then lubricated pipe ends slide in under rings smoothly, easily and surely.

Pipe ends stop positively—with ends automatically separated within coupling. This separation gives the line flexibility to withstand shock and vibration, relieves line stresses, permits conformance to curves. Installations can be completed under adverse weather, temperature or terrain conditions. No complicated equipment is required.

Transite Pressure Pipe and the Ring-Tite Coupling are made of asbestos and cement. Strong and durable, they cannot rust; are highly resistant to corrosion. Tested to A.W.W.A. specifications.

For the new Ring-Tite folder TR-142A—please write to Johns-Manville, Box 60, New York 16, N. Y.

(See us at Seattle—Booths 70-72 A.W.W.A. Convention)

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE PRESSURE PIPE

NOW WITH THE RING-TITE COUPLING

Now's the time to mail this month's Readers' Service card.

To order these helpful booklets, check the coupon on page 34.

What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 310 E. 45th St., New York 17, N. Y. Check the coupon and we will forward your request.

How Cities Clean Sewer Lines From Street in One Operation

25. In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of OK Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that take dirt from sewer to street in one operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

Complete Sanitation and Process Equipment Bulletin

40. A complete illustrated bulletin gives detailed information on all "Rex" sanitation and process equipment. 36 pages of engineering data, process description, conversion factors. Get Bulletin 51-83 by checking the coupon Chain Belt Co., Box 2022, Milwaukee 1, Wis.

A Handbook of Sewer Cleaning Methods and Materials

44. Complete, easy-to-follow directions for every type of sewer cleaning operations and the equipment needed for effective cleaning work is covered in a 40-page booklet issued by Flexible Sales Corp., 3786 Durango, Los Angeles 34, Calif. Full details are provided on power cleaning machines, the SeweRodeR, hand tools and all accessories. Water main and culvert cleaning methods are included. Check the coupon for your copy of this helpful handbook.

Effective Shredder For Dried Sewage Sludge

72. The rugged and compact Royer Sludge Disintegrator does a quick and effective job of preparing sludge for use as a fertilizer on city properties or for sale to others. Several models, portable and stationary, suitable for every size plant and power source are described in Bulletin 643-A, issued by the Royer Foundry and Machine Co., Kingston, Pa. Get a copy by checking the coupon.

High Rate Filters For Sewage Treatment

74. Accelerated biological oxidation in treatment of sewage and other organic wastes is a feature of Infilco's Accelo Filter system. Bulletin 6200 explains the direct recirculation principle, shows plant layouts, and gives performance data. For your copy write Infilco Inc., Box 5033, Tucson, Ariz., or check handy coupon.

Helpful Design Data For Sewage Ejectors

81. The application and advantages of pneumatic sewage ejectors are outlined in a new bulletin of the Blackburn Smith Mfg. Co., Inc., Hoboken, N. J. Included are piping diagrams for electrode and float switch controls plus dimensions and layouts for single and duplex systems. Get your copy by checking coupon.

Design Data for the Spiraflo Clarifier

124. Be sure to investigate the advantages of the Spiraflo clarifier for sewage treatment. Full engineering data, description of the unit, test results and specifications are offered in 24-page Bulletin 122 by Lakeside Engineering Corp., 222 W. Adams St., Chicago, Ill. Check the coupon today.

End Manhole Rattle The Easy Way

184. It's easy to safeguard manholes and end annoying rattles by using Tapax, a wear-resisting, resilient manhole cushion available in convenient 100-ft. reels from Joseph G. Pollard Co., Inc., New Hyde Park, N. Y. Full details in Bulletin 14. Check the coupon.

Theory of Controlled Digestion With Floating Cover Tanks

88. In an excellent 40-page booklet, an authoritative discussion of digestion theory and practices, including design, operation and economics is presented by the Pacific Flush Tank Co., Chicago 13, Ill. Complete data are given on the use of floating covers, together with details on tank construction, piping and control chambers. Requests for this valuable booklet must be made on business letterhead.

Sewer Capacity Speedily Restored By "Reboring" Service

178. An attractive brochure offered by National Power Rodding Corp. describes their mobile unit with specially designed power rodding drive and central mechanism that gets on the job fast; rebores clogged sewers and drains cleanly and safely without impeding traffic or disturbing property. Check the coupon or write National Power Rodding Corp., 4600 West Madison Ave., Chicago 44, Ill.

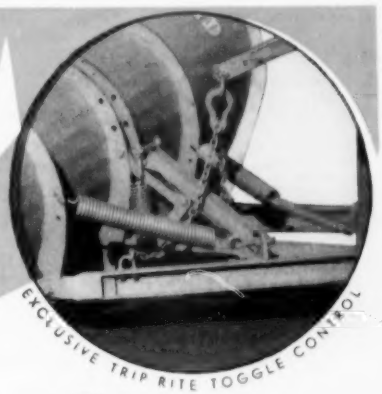
A Short Course In Pipe Jointing

169. The story of rubber couplings for clay and concrete pipelines is graphically presented in the booklet "Pipe Enterprise", published by Hamilton Kent Mfg. Co., Kent, Ohio. Detailed description of pipe jointing methods, photos showing jobs where Tylox gaskets met the need for easily assembled, permanently tight joints installed under all conditions; and a report on the development, manufacture and outstanding features of the compression type gasket make this booklet valuable to every engineer and contractor. Check the coupon for free copy.

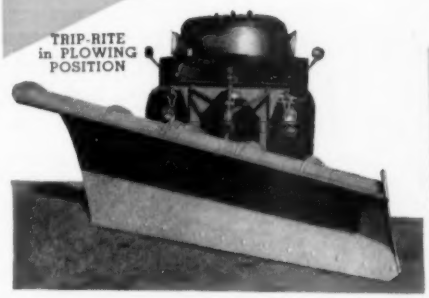
Reference Book on Lubricated Plug Valves

273. Lubricated plug valves, including stick-proof lever sealed valves for easy operation and positive mechanical seal are fully described in reference books issued by Homestead Valve Mfg. Co., Box 550, Coraopolis, Pa. Check the coupon for your copy.

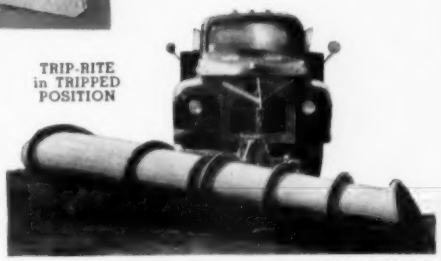
here's the SECRET of the FINEST Snow Plow TRIP ACTION you have ever seen



The Sensational, New DAVENPORT-FRINK ONE-WAY BLADE TRIP-RITE SNO-PLOWS



- Meets the need for efficient high speed snow clearance without interruption because of manholes, hummocks of frozen gravel or ice, etc.
- Solves the problem of firm tripping and instant righting without damage to the power vehicle.
- A sturdy, simple and ingenious toggle arrangement trips the plow at the right time and with MINIMIZED SHOCK.
- Integral deflector with king size rib reinforcement another of many notable features.



TRIP-RITE Sno-Plows are being welcomed by both city and county officials responsible for snow clearance. The danger and annoyance of obstructions has been done away with. At top speed, TRIP-RITE Trips and Rights, in Split Second Action, with Dampened Shocks and Full Safety. Write us today for complete TRIP-RITE information. You'll find that you've been waiting for TRIP-RITE.

Complete Information on Request

DAVENPORT BESLER CORPORATION
2305 Rockingham Road, Davenport, Iowa, U.S.A.

To order these helpful booklets, check the coupon on page 34.

Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinders, grit collectors, "Jigrit" washers, sludge collectors, feeders, conveyors and other related units. Photos and drawings of installations plus capacity tables complete this valuable booklet. Use coupon or write Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

Helpful Data on Venturi Type Meters

221. The Simplex type MO Meter for measurement of water, sewage, sludge and industrial liquor flows over wide ranges, is featured in an information-packed bulletin, No. 500, issued by Simplex Valve & Meter Co., Philadelphia 42, Pa. Get this bulletin for data on operation, construction, accuracy, primary devices and other information of interest to engineers who deal with fluid flow problems. Check the coupon.

Getting Improved Sludge Dewatering With Non-Clogging Vacuum Filters

258. Latest information on the Komline-Sanderson "Coilfilter", which features non-clogging, permanent filter media to obtain constant output and low operating cost is presented in illustrated Bulletin No. 102 by the Komline-Sanderson Engineering Corp., Peapack N. J. Be sure to investigate this improved method of sludge dewatering. Check the coupon today.

Data Offered on Root-Proof Pipe and Fittings

352. Orangeburg sewer pipe and fittings with root-proof Taperweld joints are described in a comprehensive bulletin offered by Orangeburg Mfg., Co., Orangeburg, N. Y. Detailed information is included on layouts and installation for sewerage and drainage. Get 12-page Catalog No. 306 by checking the coupon.

Book Tells How to Control Root Stoppages

249. Details on the proven use of copper sulfate to control root and fungous growths in sewers are contained in a brand-new book published by Phelps Dodge Refining Co., 40 Wall St., New York 5, N. Y.

Chemicals Used in Water, Waste and Sewage Treatment

276. A new chart giving information on the form, weight, solubility, strength and use of common water, sewage and waste treatment chemicals is available from Wallace & Tiernan, 25 Main St., Belleville 9, N. J. Data on materials suitable for handling each chemical in either its dry or solution form are included. Check the coupon today.

Helpful Data on Bermico Pipe Fittings

280. Data are now available on fittings for use with Bermico sewer pipe and perforated pipe—T's, Y's and bends to make complete root-proof, water tight, corrosion-resistant Bermico pipe systems. Get full information by checking the coupon. Brown Co., 150 Causeway St., Boston, Mass.

Cleaning Service for Every Type of Pipe Line

302. Flexible Pipe Cleaning Co., operating with specialized equipment and trained crews, is prepared to remove scale, rust and other deposits from pipes for every type of service. For details and estimates furnished without obligation write Flexible Pipe Cleaning Co., Box 167, Los Nietos, Calif. or check the coupon.

Get the Facts on The Contact Aeration Process

303. Full engineering details on the submerged contact aeration process of sewage treatment, including diagrams of plant units, area requirements, operating costs and other details are available in a bulletin of the Hays Process Co., Box 768, Waco, Texas. Check the coupon to get the facts.

Data Offered on Water, Sewage and Waste Treatment Equipment

263. Equipment for sewage treatment, water purification and industrial waste treatment is described in a 16-page Book No. 2440, published by Link-Belt Co., Colmar, Pa. Case histories, photographs and schematic drawings are included. Straightline and Circuline collectors, Thru-Clean and Straightline bar screens, Tritor screens, flash mixers, scum breakers and other units are described. Check the coupon for your copy.

Reduced Sludge Volume Cuts Sewage Treatment Costs

246. The applications, operation and advantages of the Dorreo "Densludge" process for the production of thicker sewage sludge are covered in Bulletin 6260, available from the Dorr Co., Barry Pl., Stamford, Conn. Operating results, flow-sheets and full engineering data are included. Get your copy promptly by checking the coupon.

●

CONSTRUCTION EQUIPMENT AND MATERIALS

What's Your Digging Problem? Repair Work? Trenches? Footings?

35. At today's prices, hand digging means the job will be costly. You can dig through asphalt and macadam, work fast and efficiently even in cramped areas with the tractor mounted Sherman Power Digger. From one position you can reach to dig 14 feet behind tractor in 140° arc and dig to a depth of 10 feet. For full details check the coupon. Sherman Products, Inc., Royal Oak, Mich.

First and Foremost in the FLOATLESS CONTROL FIELD

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Floatless
LIQUID LEVEL and INDUSTRIAL CONTROLS
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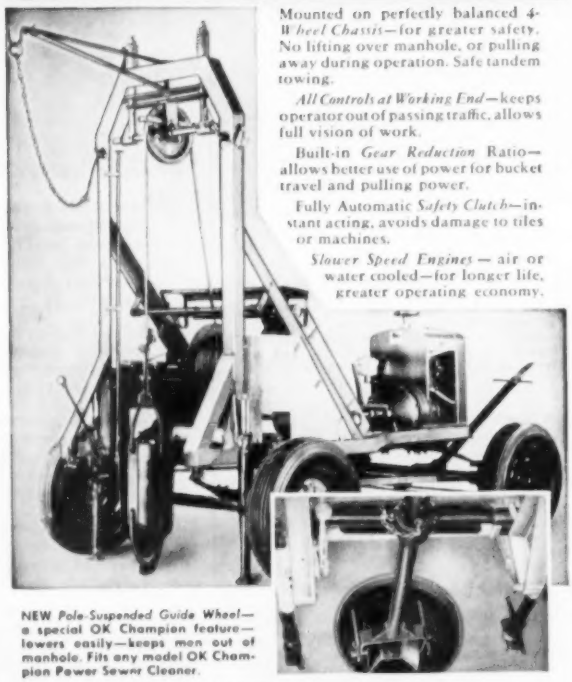
B/W CONTROLLER CORPORATION
2224 East Maple Road, Birmingham, Michigan

FIRST IN THE FLOATLESS CONTROL FIELD

OK CHAMPION POWER SEWER CLEANERS



Mounted on perfectly balanced 4-*Wheel Chassis*—for greater safety. No lifting over manhole, or pulling away during operation. Safe tandem towing.

All Controls at Working End—keeps operator out of passing traffic, allows full vision of work.

Built-in *Gear Reduction* Ratio—allows better use of power for bucket travel and pulling power.

Fully Automatic *Safety Clutch*—instant acting, avoids damage to tiles or machines.

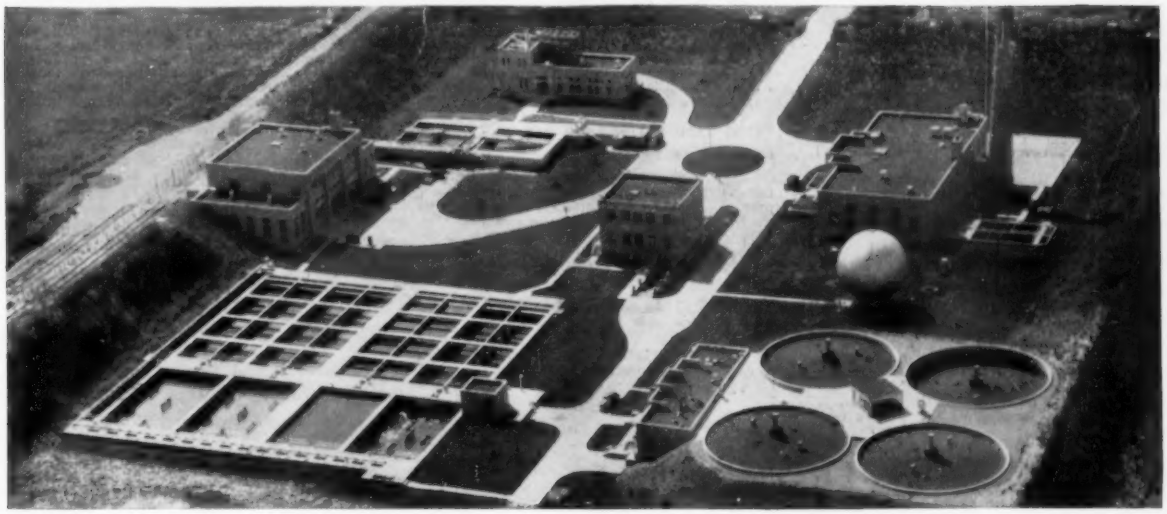
Slower Speed Engines—air or water cooled—for longer life, greater operating economy.

NEW *Pole-Suspended Guide Wheel*—a special OK Champion feature—lowers easily—keeps men out of manhole. Fits any model OK Champion Power Sewer Cleaner.

Write for latest OK Champion Circular

CHAMPION CORPORATION • 4752 Sheffield Ave. • Hammond, Ind.

"Little Miami"—first of 4 new sewage treatment plants for Cincinnati's metropolitan area



Cincinnati leads Ohio River clean-up program

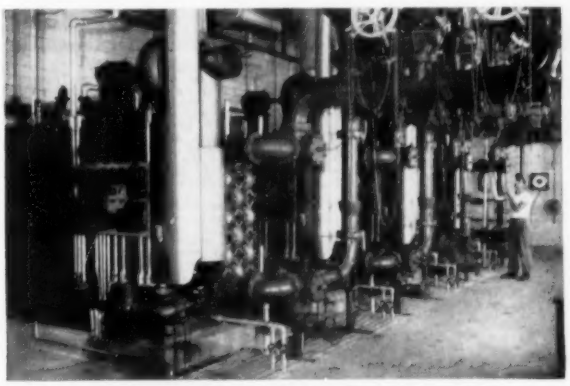
Four-plant, 154 MGD project includes PFT "Controlled Digestion"

Leading an 8-state drive for modern sewage disposal in the Ohio River Valley, Cincinnati recently completed the first of 4 sewage treatment plants to serve the entire metropolitan area. Their splendid new system has encouraged other Ohio River municipalities in this great clean-up program!

Called "Little Miami," the new 29 MGD plant adopted the following items for PFT "Controlled Digestion":

(1) *PFT Floating Covers* in the four 65′ digesters for positive scum submergence, safe utilization of gas and simplified operation.

(2) Four *PFT Cover Position Indicators* to record the liquid level in each digester.



Four No. 750 PFT Heater & Heat Exchanger Units.

(3) Four *PFT Supernatant Selectors* for automatic, continuous withdrawal of the best digester liquor, along with *PFT Gauge, Sight-Glass and Sampler* units.

(4) Four *PFT No. 750 Heater & Heat Exchanger* units to keep digesters at optimum temperatures of 90°-95° F. Fired by sludge gas *or* oil, these units cut fuel costs by utilizing all sludge gas available, automatically changing to oil as necessary. In addition to sludge heating, these units provide heat for the digester control building.

Little Miami will be followed by the 120 MGD Mill Creek plant, the largest of the group. PFT has already received extensive orders for "Controlled Digestion" equipment in the huge new plant including 12 PFT 110′ diameter Floating Covers with PFT Aluminum Prefabricated Roof Decks, and PFT Pearth Gas Recirculation Equipment and 23 PFT External Heat Exchanger Units.

Design of plants by / *Havens & Emerson, Consulting Engineers, Cleveland, Ohio*

P.F.T.

waste treatment equipment exclusively since 1893

PACIFIC FLUSH TANK CO.

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To order these helpful booklets, check the coupon on page 34.

STREETS AND HIGHWAYS

Do You Have Complete Black Top Equipment Data?

41. In 36-page catalog AA a full line of maintenance is covered. Units described and illustrated include several models of pressure distributors, supply tanks, sprayers, brooms, asphalt kettles, portable rollers, and accessory tools. Use coupon for copy of this handy manual. Littleford Bros., 452 E. Pearl St., Cincinnati 2, Ohio.

Helpful Installation Manual For Drainage Structures

62. A 46-page manual, well worth careful study by designers and field engineers dealing with drainage structures, culverts, sewers or conduits, is offered by Armco Drainage & Metal Products, Inc., Middletown, Ohio. Proper location of the structures, base preparation, assembly and backfill are some of the many items covered in detail. Use the handy coupon for free copy.

Concrete Saw Cuts Patches, Trenches, Contraction Joints

85. Savings of up to 50% in labor and materials is claimed by sawing repair patches or trenches for sewer, water, gas lines in concrete or asphalt. In new concrete construction sawed joints control contraction cracking and eliminate costly hand formed joints. Full information on how you can economically saw concrete from Clipper Mfg. Co., 2823 Warwick, Kansas City, Missouri. Check the coupon.

Better Highways Through Salt-Soil Stabilization

162. Practical information for the men who build, repair and maintain our highways is provided in two bulletins issued by the International Salt Co., Inc., Scranton, Pa. General principles of salt-soil stabilization, applications, plant mix and road mix are described. Check the coupon for your copies.

Get Data Now on This Catch Basin Cleaner

198. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clarke-Wilcox Co., 118 Western Ave., Boston 34, Mass.

What Should You Look For In a Power Sweeper?

206. Helpful information to aid you in the selection of a power sweeper to fit your needs is provided in Bulletin 85.2, issued by G. H. Tennant Co., 2530 N. Second St., Minneapolis 11, Minn. Full data on the highly maneuverable Tennant Model 75 Sweeper is included. Get your copy by checking coupon.

Economical Answer to The Leaf Raking Job

231. The Turbo-Jet power leaf mill makes it easy to have neat, leaf-free lawns; gets at hard to reach places; sucks up leaves and pulverizes them to a fine mulch; does the work of ten men with rakes. For full information write to Turbo Jet Mfg. Co., 22 Bowman Terr., Cincinnati 29, Ohio, or use the coupon.

The Bros Line of Road Machinery

289. An illustrated folder describing the Bros line of road machinery is available from Wm. Bros Boiler & Manufacturing Co., Minneapolis 14, Minn. Full descriptions of Bituminizer distributors, Spraymatic spray bars, several types of compacting equipment and other units are included. Check the coupon.

Cut the Cost of Road Rehabilitation

332. Be sure to investigate the Hetherington & Berner "Moto-Paver," the machine that does a complete mixing and laying job in one continuous operation. Specifications and complete information on both standard and heavy-duty models is provided in Bulletin MP 53. Get your copy from Hetherington & Berner, Inc., Indianapolis, Ind., or check the coupon.

"Encyclopedia" on Bulldozers

97. Every size and style of bulldozer made by Caterpillar Tractor Co., Peoria 8, Ill., is shown in a 36-page booklet, Form 30461. Cutaway views showing details, important components of hydraulic and cable controls, attachments such as brush, root and rock rakes, treedozers and stumpers are also included. Get this interesting publication by checking the coupon.

Use Hot Patch Material On All Maintenance Jobs

297. With the Barber-Greene Mixall you can get hot patch material wherever and whenever you need it for all maintenance jobs. Send for new 8-page bulletin that gives full information on this small, highly portable unit that turns out all types of bituminous patch material in any quantity you need. Write Barber-Greene Co., Aurora, Ill., or use the coupon.

Think of Aerial Surveys When You Need Maps

311. Every engineer and public official should investigate aerial surveys for maps of new areas, up-to-the-minute maps for city planning, highway relocation, surveys to plan extensions of sewers, water mains and utilities. Precise contours for topographic maps and other data in any detail desired can be furnished by Aero Service Corp., 236 Courtland St., Philadelphia 20, Pa. Interesting booklet on aerial mapping services and methods available by checking the coupon.

What A Road Roller Should Give You

325. Many engineering design features that make Buffalo-Springfield rollers the answer to your needs are described in an attractive bulletin covering the C-Model Two-Axle Tandems of Buffalo-Springfield Roller Co., Springfield, Ohio. Included are details on open gridwork for better operator visibility, increased ground clearance and bevel gear drive. Investigate these and many other features listed in Form No. S 61-53. Check the coupon.

It's True There are Other "Good" PIPE DETECTORS

But...

before you buy a pipe detector from anyone — CHECK THESE IMPORTANT FACTS.

and EACH ONE WILL PERFORM ALL THESE JOBS:

- Detect, trace and center pipe, cable, etc.
- Estimate depth
- Separate parallel pipe, cable and conduit

1. Is there a WRITTEN LIFETIME GUARANTEE?
2. Do you get a liberal TRADE-IN ALLOWANCE on your present used equipment?
3. Will they agree to in-the-field competitive testing on *performance—accuracy—reliability?* We think our pipe detector is best—others think theirs is. WHY NOT GET THE FACTS ON THE "505" PIPE DETECTOR and *COMPARE!!*

WRITE TODAY for the complete "505" story!!

THE Detectron CORPORATION, *Dept. 55*
5420 VINELAND AVE., NO. HOLLYWOOD, CALIF.

ROAD MAINTENANCE EFFICIENCY IS YOURS *with a . . .*

3 UNITS IN ONE

LITTLEFORD 101 UTILITY SPRAY TANK

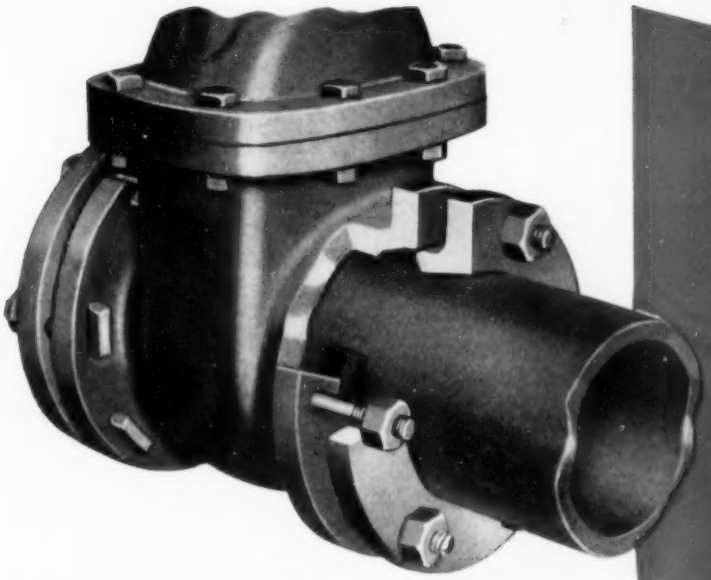
Just trail this 101 Utility Spray Tank behind a maintenance truck and you'll be surprised the road work you can do in a single day. The 101 will handle small application jobs, hand spray patch work, fill pouring pots for patch and crack filling work. It's Utility plus—and the 101 will handle Asphalt, Tar, Emulsion, Road Oils, and Cut-Back and there's a size for every job, made in two wheel trailer models 400 and 600 gal. truck mounted 600 to 1000 gal. and 4 wheel trailer 600 to 1250 gal. For fast, efficient road maintenance work the 101 has no equal.

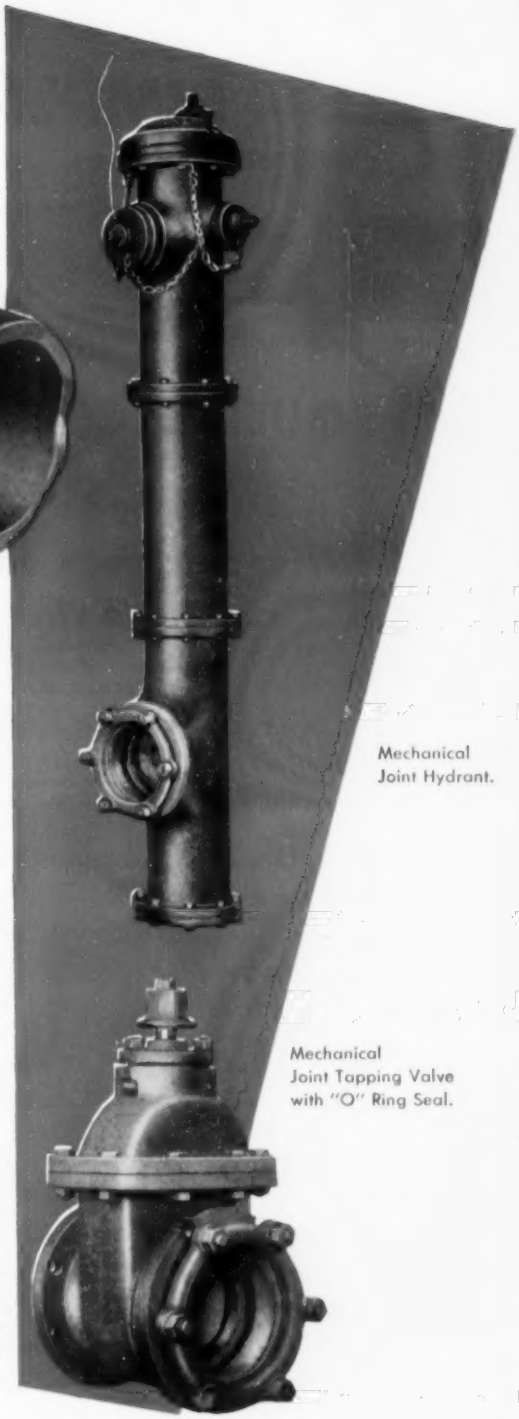
Equipment with BUILT-IN ENGINEERING LITTLEFORD

Purchase the equipment with the Littleford "Built in Engineering" Seal and be sure its Engineered for the job.

LB LITTLEFORD

LITTLEFORD BROS., INC.
452 E. Pearl St., Cincinnati 2, Ohio





Rensselaer

VALVES AND HYDRANTS *with Mechanical Joint*

Mechanical Joint Hydrant.

Mechanical Joint Tapping Valve with "O" Ring Seal.

The surest way to reduce installation costs and insure long service with low maintenance on cast iron pipe lines is to use Rensselaer Valves and Hydrants with Mechanical Joints.

The installation cost is reduced because an unskilled laborer can make the connection in a few minutes with only one wrench.

Low maintenance is assured by the dependability of this type of connection which has been tested and proven in thousands of installations.

Rensselaer Gate Valves are built rugged and simple, designed to give positive seating action and long life. They are easy to operate, are made of high quality materials and conform to A.W.W.A. specifications.

Rensselaer Fire Hydrants are designed on the knuckle joint principle and open with the pressure. They are quick opening with free-flow, long radius curves. Will not freeze or flood and no digging is required for repairs or standpipe breakage.

Rensselaer VALVE CO. TROY, N. Y.

GATE VALVES • FIRE HYDRANTS • SQUARE BOTTOM VALVES • CHECK VALVES • AIR RELEASE VALVES

SALES REPRESENTATIVES IN PRINCIPAL CITIES

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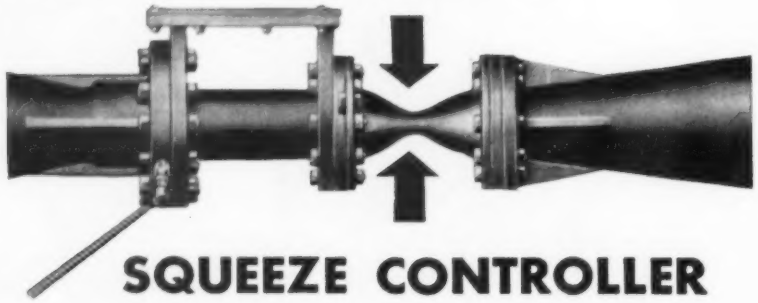
New! **SIMPLEX**



SQUEEZE CONTROLLER

Accurately Controls Flow of Sewage, Sludge, and Trade Wastes

For the first time, heavy viscous flows can be closely regulated without affecting the moving parts of the controlling device. This solves many problems...makes possible entirely new plant designs.

The core of this unit is a time-tested venturi tube with a special throat section of flexible rubber. Differential pressure in the venturi is transmitted to a Simplex Type H Rate Setter which both measures and maintains the rate of flow desired.

If flow tends to change, Type H Rate Setter actuates the motor-driven clamping device to adjust the flexible throat area . . . quickly returns flow to the control point.

Look at these advantages. A Simplex venturi tube, the most accurate form of primary device, does double duty. It measures as it controls. The throat section is self-scouring. Viscous fluids contact no moving parts.

Write for complete details today!

Simplex Valve & Meter Company
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VALVE AND METER COMPANY

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What You Should Know About
Air-Placed Concrete

67. For a detailed explanation of the principle of "gunned" or "air placed" concrete and description of the improved Model 750 and 1250 Bondactors, be sure to get your copy of Form 553 from Air Placement Equipment Co., 1011 W. 24th St., Kansas City 8, Mo. Check the coupon today.

Examine a Tractor
Piece by Piece

99. The 32-page catalog published by International Harvester Company should be studied by every tractor owner, for in it each unit from engine to track of the TD-2 Diesel is considered separately. These piece by piece discussions are supplemented by notes on easy servicing, versatile applications and attachments for every need. Get your copy of form CR-313-A from International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill., or check the handy coupon.

Helpful Booklet on Carryable
Centrifugal Pumps

129. A booklet prepared to give practical information that will guide you in choosing the best type of pump for your requirements is offered by the Homelite Corp. Both gasoline and electric models are discussed, and requirements outlined for many applications. Just check the coupon for your copy. The Homelite Corp., 2125 Riverdale Ave., Port Chester, N. Y.

One Basic Unit with Attachments
Does a Multitude of Jobs

149. You'll find full descriptions of the Davis Pit-Bull unit and versatile, easy-to-change attachments in the handsome new bulletin of Mid-Western Industries, Inc., 1009 S. West St., Wichita, Kans. There's a loader, trencher, dozer, roller, mower, rotary broom, post auger, crane, hammer and lift fork—units for every type of municipal maintenance and construction job—all coordinated for use with the same powerful basic unit. Be sure to investigate this remarkable equipment. Get the full story by checking the coupon.

Your Property is Worth
Good Protection

176. When installing chain link fence you want protection against rust and corrosion as well as vandalism. Investigate chain link fence made of "Konik" metal described in "Planned Protection" published by Continental Steel Corp., Kokomo, Ind.

How the "Payloader"
Helps Public Officials

190. An attractive new booklet "Getting More for the Tax Dollar with Payloaders" makes worthwhile reading for every public official in charge of construction and maintenance of roads, streets, and utilities. You will find illustrations and data showing dozens of ways the "Payloader" is used by cities, counties and states, plus convenient specifications on seven models. Check the coupon or write Frank G. Hough Co., 761 Seventh St., Libertyville, Ill.

Have You Investigated
Aluminum Gratings?

200. Aluminum gratings for walkways, bridge decking, and stair treads save weight, resist corrosion and are easily handled. Get complete design data, including safe load tables, standard panel widths and weights, from Irving Subway Grating Co., 50-53 27th St., Long Island City 1, N. Y. Just check the handy coupon.

Complete Protection
Of Iron and Steel Products

242. What are the advantages of Hot-Dip Galvanizing? Why does it offer complete protection at such an economical cost? You'll find the answers in the attractive booklet "Stop Rust", which gives you the full story of the process plus a comprehensive coating comparison chart. Get your copy promptly by checking the coupon or write American Hot-Dip Galvanizers Assn., Inc., 1st National Bank Bldg., Pittsburgh 22, Pa.

8 Reasons Why You Should Check the Jaeger Loader

207. In a profusely illustrated 16-page catalog devoted to the applications and special design features of the Jaeger "Load-Plus" tractor-loader unit, eight good reasons listed to back up the claim that this machine outproduces any other loader of its size. These include load capacity, balance, reach, maneuverability, automatic power adjustment by torque converter, instant reversal, multiple speed and ease of control. Check them all by getting a copy of Catalog L100-3. Check the coupon today. Jaeger Machine Co., 400 Dublin Ave., Columbus 15, Ohio.

●

SNOW AND ICE CONTROL

Attachments Keep Snow-Thrower On Job the Year 'Round

46. A variety of attachments designed to fit the rugged tractor unit of the Maxim Snow Thrower make it an all-year worker ready for mowing, cutting, dozing, towing and rolling. Full details on these economical snow throwers and their useful attachments are covered in bulletins offered by Maxim Silencer Co., 85 Homestead Ave., Hartford, Conn. Check the coupon for this data.

Uniform Salt and Cinder Spreading at All Speeds

93. Be sure to investigate the hydraulically operated ground drive offered by Baughman to give you the advantages of two drive speeds and uniform distribution of material regardless of truck speed, but without the need for power takeoff or transmission. Full data on this and many other features in Form A-380. Baughman Mfg. Co., Jerseyville, Ill.

Uniform Salt Spreading Saves Material

145. The wide, thin pattern provided by Tarco "Scotchman" spreaders avoids salt waste, saves time and labor. Get Folder BL for full details on this spreader and table of material application rates. Use coupon or write Tarrant Mfg. Co., Dept. PW, Saratoga Springs, N. Y.

Cleaner Plowing Without Obstruction Worries

254. Dependable "Trip-Rite" snow plow trip action does away with danger and annoyance of obstructions even at high speeds. Sturdy toggle joint arrangement minimizes shock and rights plow blade in split second action. Complete information is offered by Davenport Besler Corp., 2305 Rockingham Rd., Davenport, Iowa. Check the coupon now.

Get Full Data On Aggregate Spreaders

286. Accurate control for spreading crushed rock, chips, sand or ice control materials is featured by all models of Highway Equipment Co. materials spreaders. Data on both trailer and tailboard types available by checking the coupon. Highway Equipment Co., 630 D. Ave., Cedar Rapids, Iowa.

Snow Removal Problems And How to Solve Them

318. Effective snow removal demands the use of the proper equipment. For latest data on the full line of Gledhill reversible and one-way plows, V-Type plows, sturdy push frames and front frame hitches, get the bulletins offered by Gledhill Road Machinery Co., Galion, Ohio. Just check the coupon.

Snow Plows for Every Street and Highway Need

335. For details on the full line of Frink Sno-Plows, including the new taper-type reversible plow with hydraulic roll-over control, reversible trip-blade plows, Vee plows and all accessories, check the coupon today. Frink Sno-Plows, Inc., Clayton, N. Y.

THOROSEAL *Restored* this Filtration Plant

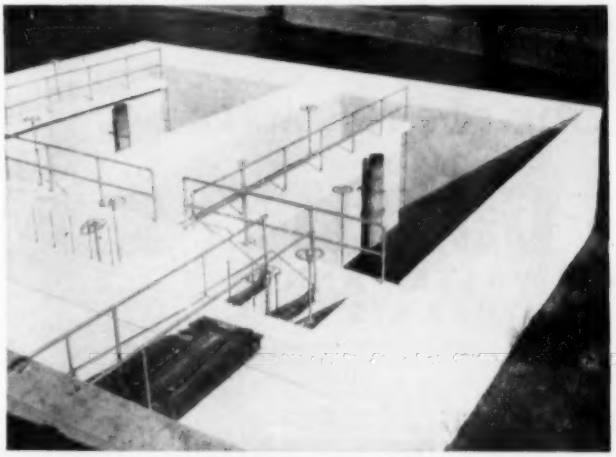
BEFORE

Example of complete break-down of masonry, due to penetration of water into body of concrete and action of frost in damp masonry.

It is amazing how THORO System products will correct a condition, such as shown in photograph. Concrete was sandblasted to remove all disintegrated material to sound concrete surface and reinforcing rods. Patching was done with THORITE Patching Mortar, bringing blistered areas to true and even lines, followed by two applications of WHITE THOROSEAL for protection.

AFTER

At minimum cost, almost ⅓ the cost of other methods, concrete restoration, patching and surface protection was completed with THORO System products on Filtration Plant in Keyser, West Virginia. Contractor: Standard Construction & Waterproofing Company, of Cumberland, Maryland.



Get our pictorially-described literature, "HOW TO DO IT" and specification guide.

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To order these helpful booklets, check the coupon on page 34.

STREET LIGHTING

Investigate These Street Lighting Standards

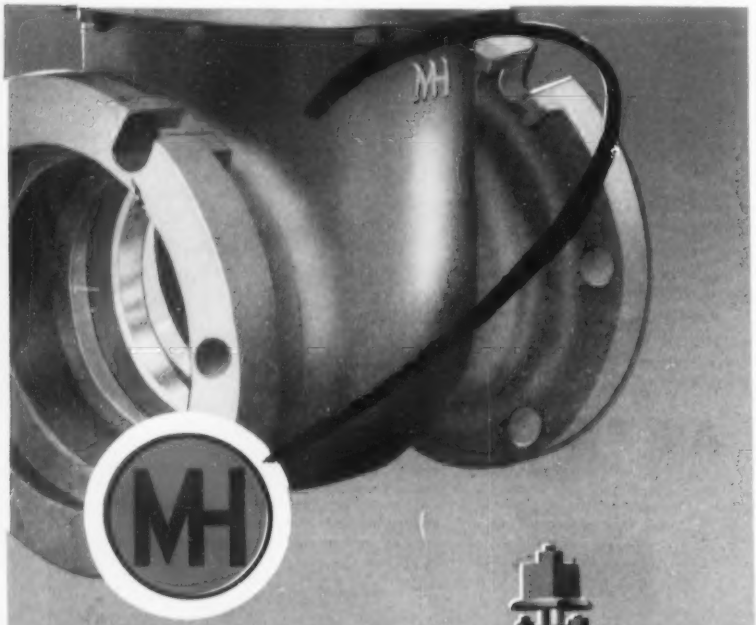
366. You can get complete data on Kerrigan factory-built "Weldforged" street lighting standards by using the handy coupon. Check these strong, well designed, yet inexpensive steel standards for practical street and highway lighting. Handsome folder also includes data sheets on floodlighting and area lighting standards. Kerrigan Iron Works, 1033 Herman St., Nashville, Tenn.

Engineering Data on Aluminum Lighting Standards

256. Latest designs and applications of all-aluminum, seamless, tapered lighting standards, traffic signal posts and elliptical lighting brackets plus detail drawings and mechanical specifications are provided in a comprehensive 16-page bulletin issued by Pfaff & Kendall, 84 Foundry St, Newark, N. J.

Street Lighting Application Curve Eliminates Calculations

257. An easy-to-use chart from which illumination level, spacing and proper mounting height can be determined has been prepared by the Illuminating Engineering Laboratory, General Electric Co., West Lynn 3, Mass. For a copy of the chart and instructions on its use check the handy coupon.



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333. For quick, easy driving in any type of soil, be sure to check Buffalo "Quick-Set" sign posts, available in any length you need and ready-punched for fast installation of signs and snow fence. Get full data from Buffalo Steel Div., H. K. Porter Co., Inc., Tonowanda, N. Y. Just check the coupon.

CIVIL DEFENSE

Do You Have An Independent Source of Electricity?

27. An independent source of electricity which will supply power for vital services when regular sources fail can be invaluable during emergencies. Check Kohler Bulletin KEP-31 which furnishes data that will help you select the plant best suited for your needs. Many models, 500 watt to 30 Kw, portable and stationary, are described. Write the Kohler Co., Kohler, Wis., or use the coupon.

Get the Facts on Air Raid Sirens

86. There's more to be considered in air raid warning sirens than the loudness of the signal. Get complete information on efficient size and spacing of sirens from Federal Sign and Signal Corp., 8733 So. State St., Chicago, Ill., by using coupon.

Does Your Water Works Have Standby Power?

224. Dependable Climax power plants are ready for emergency service to insure fire protection, and can also save power costs by peak load operation. Use the coupon for full data on Climax, 40 to 495 HP, operating on sewage or natural gas, butane or gasoline. Climax Engine & Pump Mfg. Co., So. La Salle St., Chicago 3, Ill.

REFUSE COLLECTION AND DISPOSAL

Sanitary Landfill Operation and Methods

28. The location and area requirements for sanitary landfill, operation methods for trench type and area fills, equipment selection and costs are items discussed in an 8-page booklet issued by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Be sure you have this reference when considering the problem of garbage and refuse disposal. Check the handy coupon today.

How to Reduce Refuse Collection Costs

123. The sequence of operations for fast loading and refuse compaction in the Gar Wood Load-Packer are illustrated and described in 12-page folder W-110, together with size data and details of hydraulic elements. Be sure to check all details of the efficient Load-Packer system. Check coupon or write Gar Wood Industries, Wayne Division, Wayne, Mich.

What You Should Know About Refuse Incinerators

362. Two helpful bulletins tell what you should know about low cost refuse incineration for the small community and for larger cities. Your questions on mechanical stoking, burning rates and operating problems are discussed. Get Bulletins 217 and 223 from Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y. Just check the coupon.

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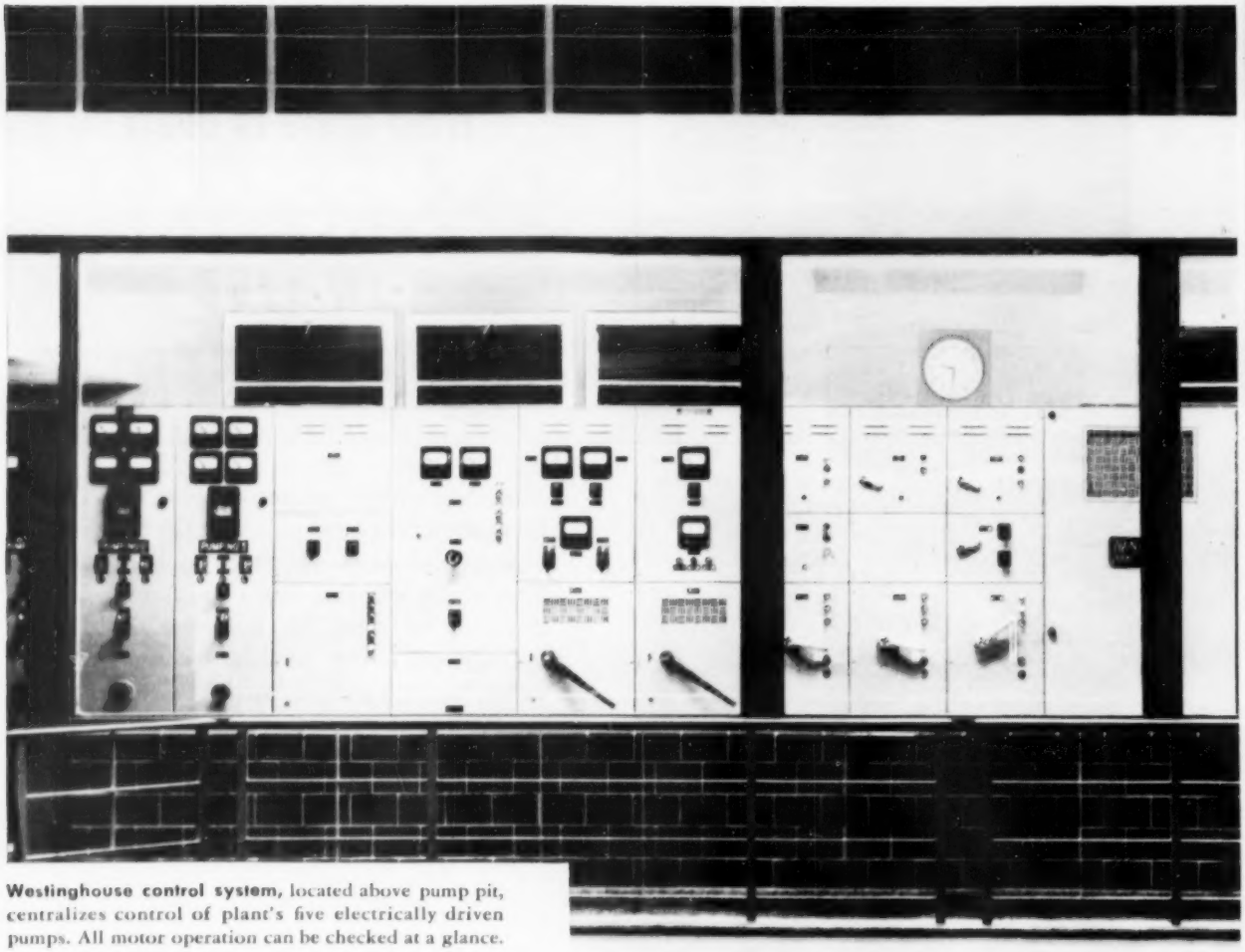
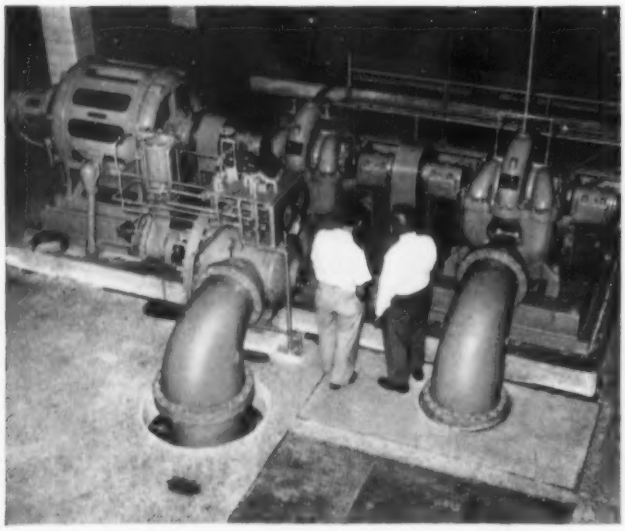


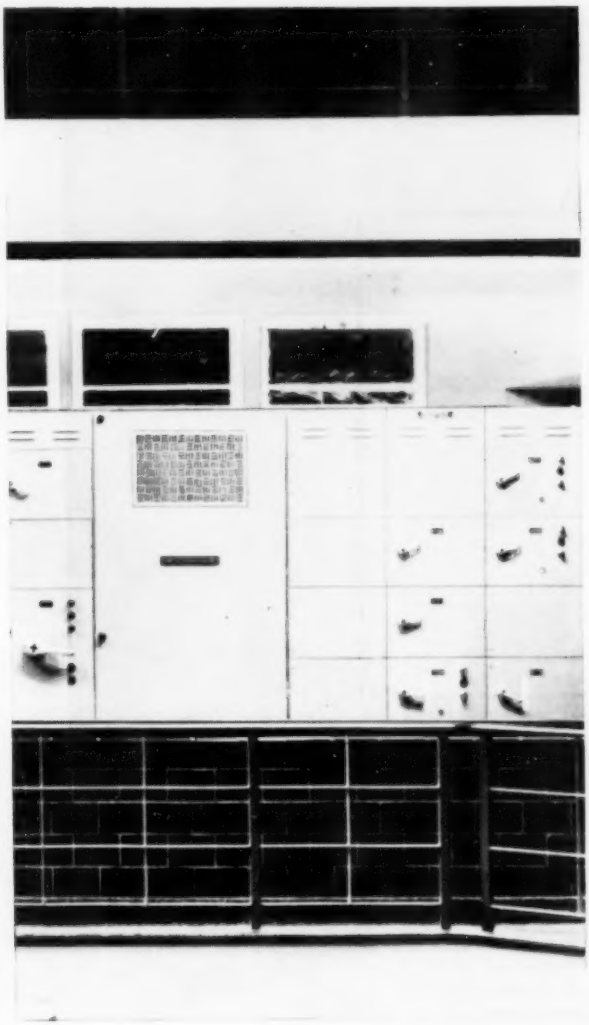
Westinghouse control system, located above pump pit, centralizes control of plant's five electrically driven pumps. All motor operation can be checked at a glance.

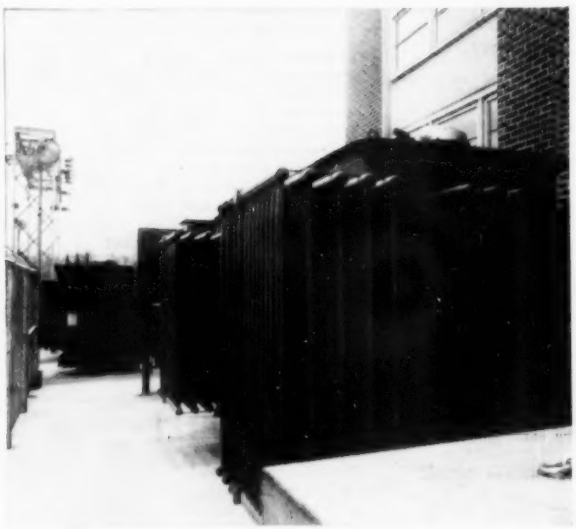


Westinghouse synchronous motor (2400 volts, 900 horsepower) operates one of the three 15-mgd electrically driven pumps at the three-million-dollar plant.

New 20-mgd filtration plant, Allentown, Pa. Consulting Engrs., Morris Knowles, Inc.; Electrical Contractor, Dravo Company—both of Pittsburgh, Pennsylvania.

Now's the time to mail this month's Readers' Service card.





Westinghouse power transformers (12,000 to 2400 volts) furnish the filtration plant's entire power supply. Left background: part of Westinghouse outdoor substation.

Allentown's outstanding filter plant has a centralized pump control system

The new 20-mgd filtration plant at Allentown, Pa., has stimulated considerable interest throughout the waterworks field. This outstanding installation doubles the available water supply and is expected to meet the city's needs for the next 30 years.

From planning stages through installation of equipment, Westinghouse teams worked closely with the consulting engineers. They helped design the electrical system. They matched it with coordinated products that met the plant's rigid requirements for attractiveness, efficiency and simplified maintenance.

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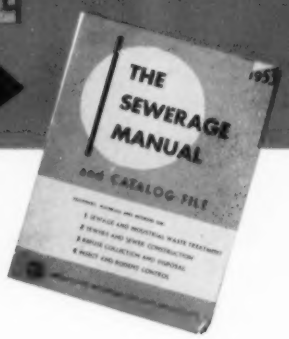

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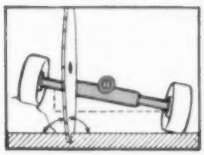

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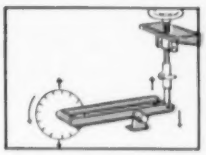

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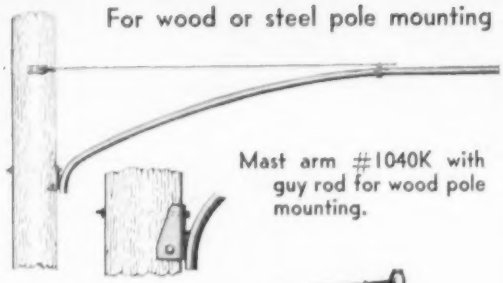
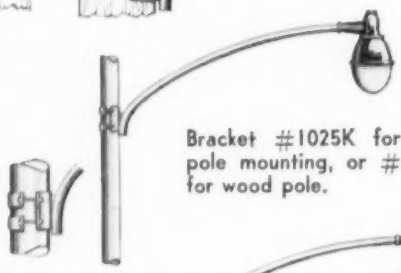
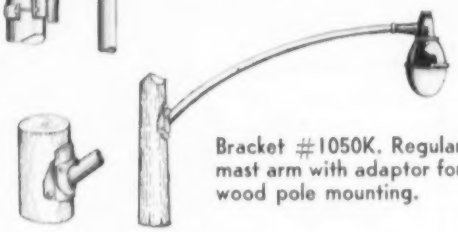


Mast arm #1040K with guy rod for wood pole mounting.



Bracket #1025K for steel pole mounting, or #1035K for wood pole.



Bracket #1050K. Regular mast arm with adaptor for wood pole mounting.

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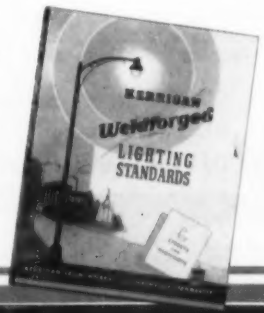

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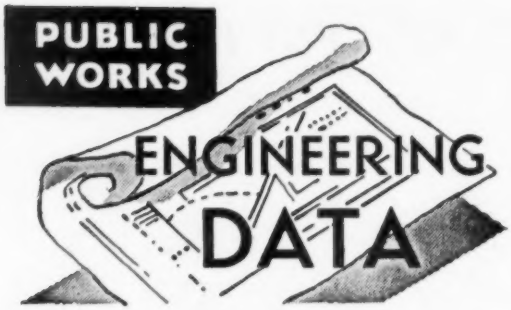


Off-Street Parking in Residential Areas

Two city-owned off-street parking lots have been put into operation by Milwaukee in residential districts—apartment and rooming house areas. One lot has a capacity of 147 cars, the other of 47. Rates for 24-hour parking are $7 per month; less for shorter periods.

Cost of Constructing Water Mains in Derby, Colo.

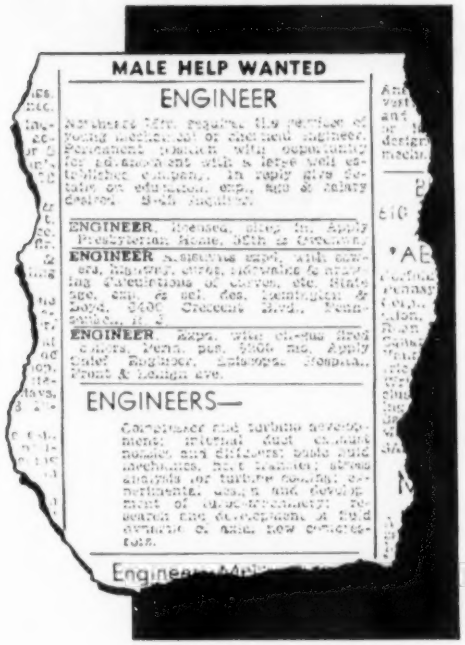
The following information on the cost of laying water mains has been sent up by Jack H. Maguire of the South Adams County Water & Sanitation District, Derby, Colo. Based on laying 100,446 ft. of 4-in. mechanical joint pipe, the cost per foot for the pipe and joint was $1.12 and for laying $0.482. For 135,507 ft. of 6-in. main, the cost for the pipe, with mechanical joint, was $1.512 and for laying $0.516 per ft. For 38,476 ft. of 8-in., the cost per ft. with mechanical joints was $2.095 and for laying $0.75.

Treating Trickling Filter Distributor Arms to Prevent Corrosion

In order to insure continued fine condition of the distributor arms on its trickling filters, Marlboro, Mass., in 1950, proceeded as follows: First, the metal was sandblasted to insure thorough cleaning; then it was given one coat of Bitumastic priming solution followed by two coats of Bituplastic No. 28. A final coating of gray industrial paint was then applied. When inspected three years later, the Bituplastic showed some slight evidence of chipping and cracking in localized areas but was, in general, in excellent condition. As a precaution, two additional coats of Bituplastic were applied. This material has a tar base and is resistant to water penetration, dilute acids and alkaline solutions.

Solving the House Service Problem When Laying a 16-inch Main

In laying a new 16-inch pipe, the Winnepeg Water District used a trenching machine and braced the trench as necessary. At each residence water and sewer services were encountered. The house sewer was immediately replaced when the trenching machine had passed. The water service line was frozen with dry ice on the house side of the trench and a section of the lead or copper service was cut out. When the new main was laid, a section of copper pipe was fitted and coupled across the trench. The frozen section was then thawed and the house connection was put back into service. This procedure was described in the annual report of the Winnipeg Water District.



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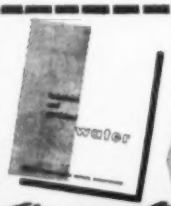

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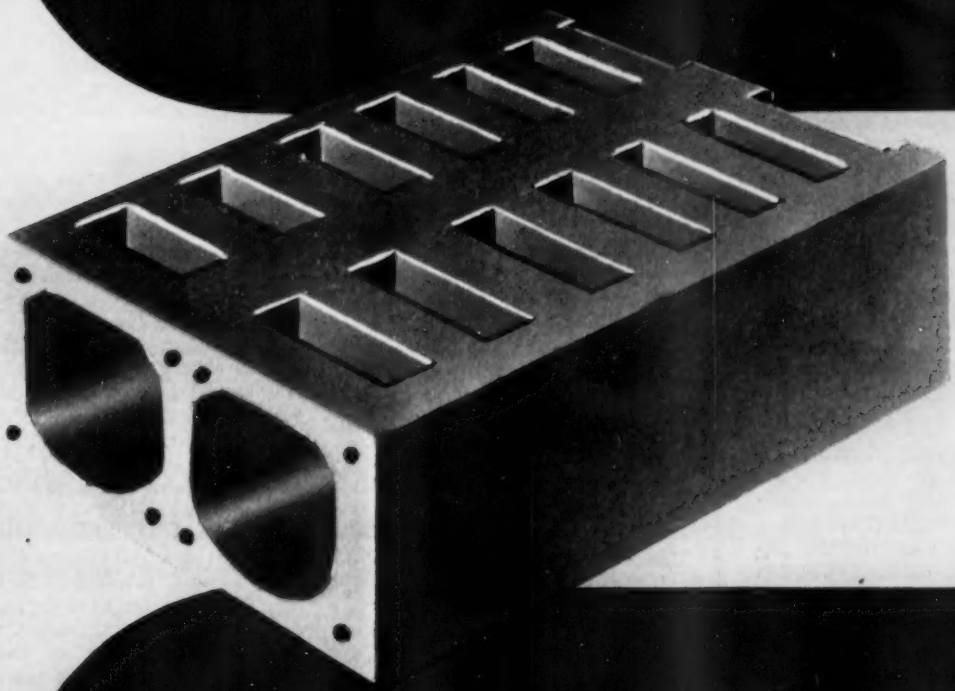

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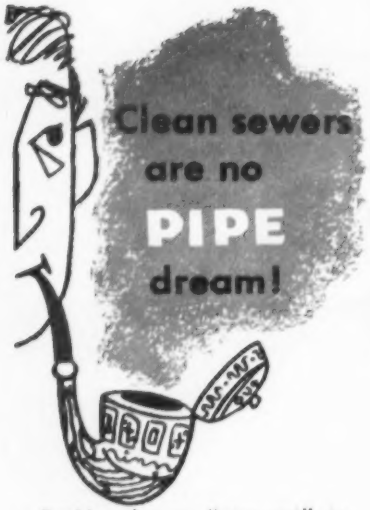

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People, Ideas and Events

BY "DOC" SYMONS

H.T.M.A.— And I hope to see you in Cincinnati at the Federation meeting, this month. Looks like a good program and I hear that the exhibit booth space is all sold out to 35 exhibitors.

★ ★ ★

I'm sorry I had to miss the New England Water Works Convention at Poland Spring, Me., but it came too close to the Federation Convention.—When I used to be on the convention circuit as part of my job, I often went to as many as 25 meetings a year. Now, I can find time only for half a dozen or so each year and I often have to miss some meetings I'd really like to attend. Come next September, 'though and I'll be at the NEWWA meeting in Lake Placid, N. Y.—

★ ★ ★

Something New Has Been Added
A letter from Ralph Fuhrman, Deputy Director of Sanitary Engineering of the District of Columbia, said, "By the end of the school year, it developed that the Johns Hopkins Department of Sanitary Engineering had no more eligible candidate for the Degree of Doctor of Engineering, so I turned out to be the Department's representative at the 'Conferring of Degrees Ceremony' on June 8."

So it's *Doctor* Fuhrman, now! Incidentally, Ralph's thesis was on the "Upper Potomac River Industrial Wastes Investigation". Throughout the entire thesis, Dr. Fuhrman used the term "hydrowastes", which was coined by his lovely wife, "Jo", as a substitute for "sewage".

★ ★ ★

How's your per capita consumption?—In a recent W & T "Chlorination Topics", A. E. Griffin (W & T's Tech. Serv. Dir.) said he had kept track of his water consumption for a year and found he was using 76 gal. per cap. per day.

That made me curious, so I asked George H. Straub, Supt. of Westchester Joint Water Works No. 1, how much I had used for the past three years. From June 1951 to June 1954, we used 6525 cu ft a year *not* including lawn sprinkling. During that time we averaged 2¼ persons in the house which means that we use about 39 gal. per person per day exclusive of lawn sprinkling.

Now, when we add water used for the lawn and flower beds, (amounting to 10,000 cu. ft. each summer—June to October), that's equal to 91 gcpd—or our total consumption is 130 gcpd.

About that lawn sprinkling—(1) my lawn is my hobby, (2) it is terraced and faces south, (3) the soil still needs building up with organics to aid its moisture retention characteristics. The amount of water I add is equal to about 17 inches of rainfall, over a period of six months. Considering the dry seasons we've had, the topography of the lot, etc., I don't think that's too much water—And I do have a beautiful lawn for about $35 a year. One summer when I didn't water the lawn regularly, I had to replace the whole thing, and that cost several times the $35 I spend for water.—My biggest problem comes when George Straub sets the sprinkling hours from 10 p.m. to 10 a.m.; how I hate to get up at two a.m. to move the sprinkler.

★ ★ ★

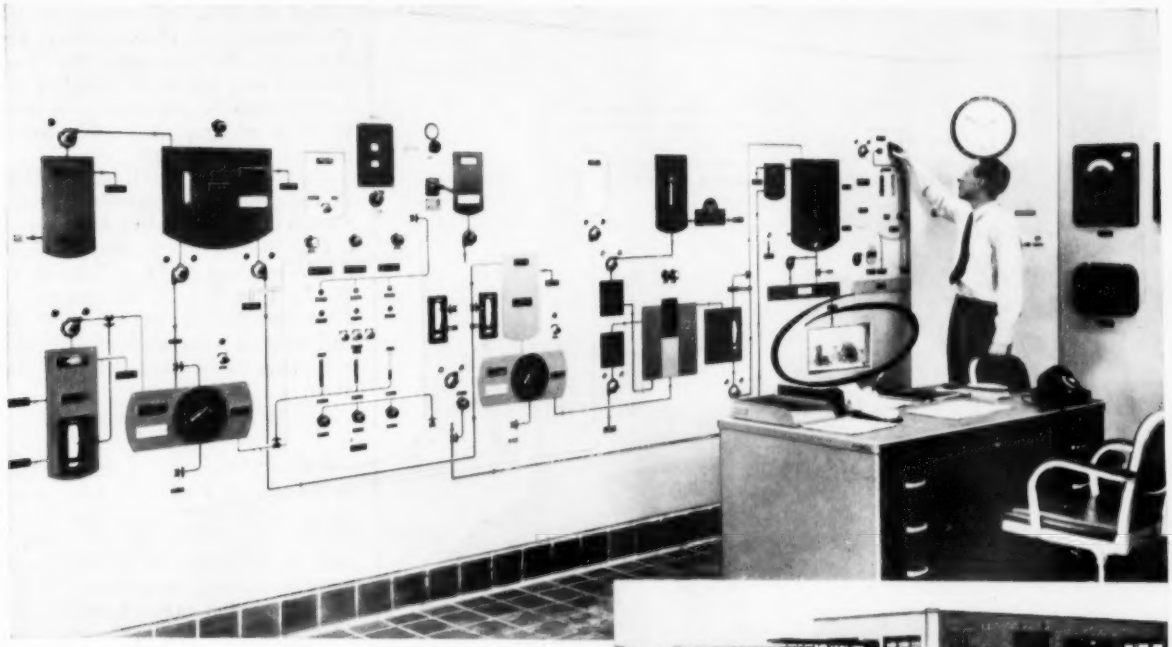
Swedefinition — Egotist—One who thinks if he hadn't been born, people would wonder why.

★ ★ ★

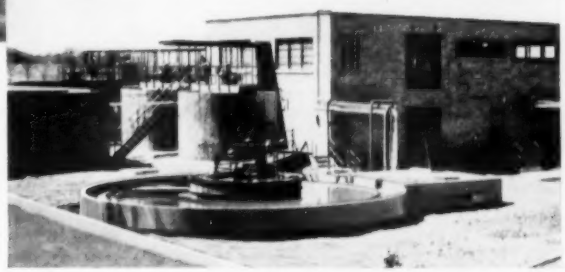
Oh No Not That—New Jersey has

Oneida, Ltd.*

keeps waste quality "fit for a fishbowl"!



. . . unique Foxboro centralized system automatically controls treatment – runs "sample" through aquarium!



Single operator at Foxboro Graphic Control Panel (above) directs combined batch and continuous processes in this ultra-modern waste treatment plant at Oneida, Ltd., Sherrill, N. Y. Alkaline and acid wastes, containing oils, cyanides, and dissolved metals are made completely safe for discharge into tiny, nearby, Sconondoa Creek. *Consulting Engineers: Westcott & Mapes, New Haven, Conn.*

There's living proof that modern waste treatment techniques under Foxboro Automatic Control completely remove the "toxic threat" from plating wastes at Oneida, Ltd., Sherrill, N. Y. Goldfish and plants flourish in an aquarium through which a sample portion of the clear, treated effluent continuously flows!

This "fishbowl check" is the end-point on the Foxboro Graphic Control Panel which gives one operator complete command of the $1-million treatment plant. Foxboro Instrumentation automatically controls such functions as flow, level, chlorine dosage, and oxidation tank transfer . . . makes 20,000 g.p.h. of complex wastes completely safe for aquatic life.

Foxboro Control Systems are continually solving similar waste problems . . . recovering valuable by-products . . . increasing use of re-circulated water . . . building better public relations. Write for complete information on instrumentation for your disposal problem. **The Foxboro Company, 2610 Norfolk St., Foxboro, Mass., U.S.A.**

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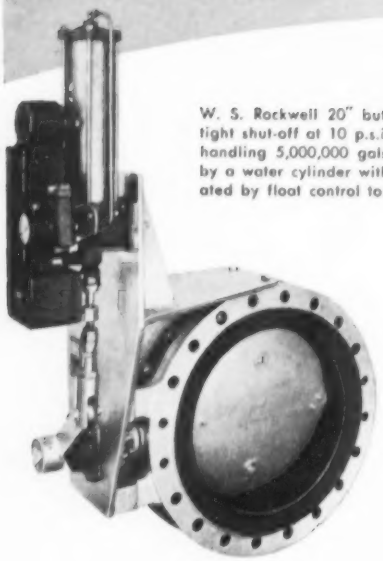
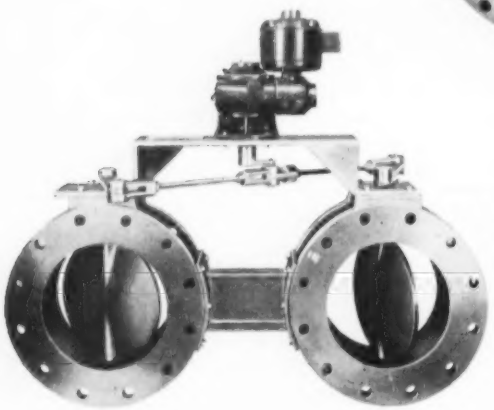
VALVES for WATER AND SEWAGE

Automatic or Manual



W. S. Rockwell 20" butterfly valve, rubber-lined for tight shut-off at 10 p.s.i., for a water treatment plant handling 5,000,000 gals. per day. Valve is operated by a water cylinder with valve blade positioner actuated by float control to maintain water level.

W. S. Rockwell 30" butterfly valve operated by an enclosed gear reducer and handwheel; used in effluent line carrying waste discharge fluids at 15 p.s.i. maximum pressure.



W. S. Rockwell double butterfly valve, linked to a single motor operator so that blades oscillate to provide alternate flow from 25% minimum to 75% maximum, in a metered sewage digestion process.

These are examples of the many butterfly, slide and special valve types, Rockwell-designed and built, for industrial applications. What's your problem?

W. S. ROCKWELL COMPANY

ROCKWELL SINCE 1888 BUILT

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Sales Representatives in Principal Cities

Now's the time to mail this month's Readers' Service card.

an excellent Dept. of Engineering in their State Health Dept. and an excellent staff of engineers. These fellows handle the stream pollution problem of N. J. very well under the laws available.—And yet, some politician in New Jersey introduced a bill in the legislature to provide a Pollution Control Board in the Division of Fish and Game in the Department of Conservation and Economic Development. The purpose of the bill is to prohibit the introduction of pollution into fresh or tidal waters, with laboratories, control personnel, etc.

Seems to me that'll be duplication of effort, and if there's one thing stream pollution control doesn't need it's duplication. I understand from Al Crew, Cons. Engr. of Ridgewood, N. J., that the N. J. League of Municipalities is against the bill and that it was shelved for this season.—I hope it's shelved for good!

★ ★ ★

Funny Thing—All during my stay in Seattle at the AWWA Convention, I didn't see Mt. Rainier. As we left on the train coming home, I sort of put it out of mind. Late in the afternoon, I wandered back to the observation car and found Dick Gelston (Water Supt., Quincy, Ill.) all alone.

Dick was reading the Milwaukee Road travel folder of "Notes Along the Trail of the Olympian Hiawatha" and said, "It says here you can see Mt. Rainier from a high bridge just after leaving Renslow in the Summit Mountains.—We had just left Renslow, ahead we could see the trestle bridge. As we crossed it we looked, and there, faintly in the fading daylight, was Mt. Rainier. The train curved again and it was gone. If I'd been a few minutes later, I never would have seen the beautiful Rainier.—By the way, I found out that Dick is an inveterate cross word puzzle addict.

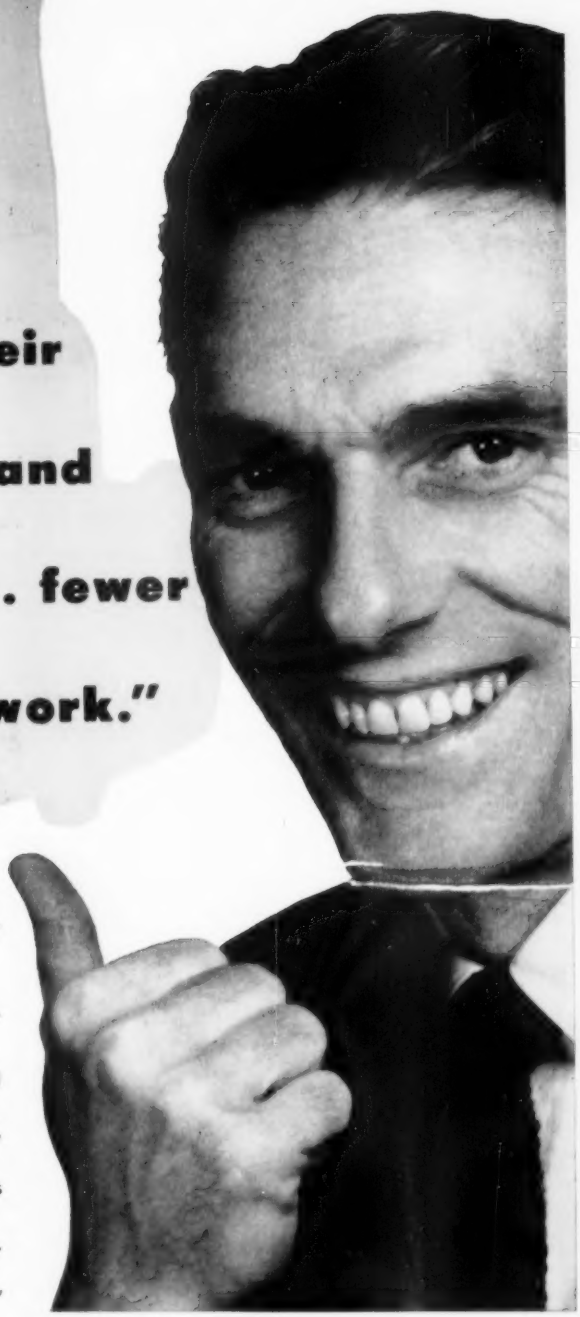
★ ★ ★

Luminous Quote — "Don't tell your customer how you make your product, but what it will do for him"—Heard at a Manufacturers' Association lunch during an AWWA meeting.

★ ★ ★

It's News To Me — Leo Louis, who was Supt. of Water, Cedar Rapids, Iowa, resigned that post in May to become Supt. and Gen. Mgr. of the Gary-Hobart Water Co. in Gary,

"We use American Meters because of their simple design and quick servicing . . . fewer men handle the work."



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Even when AMERICAN METERS are frozen, we find no damage to anything but the frost bottom. All internal parts, including the gear train, have separated, avoiding ice damage. Breaking pressure of the replacement frost bottoms has been predetermined at the factory, so we don't need torque wrenches on the nuts. Yes, when we think of economy in water meters, we think of AMERICAN METERS."

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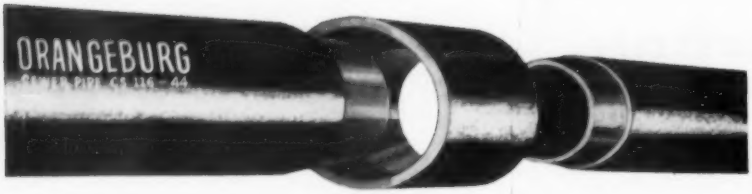

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Over 100,000,000 feet of Orangeburg Pipe in service! Orangeburg Root-Proof Pipe is for sewer lines from house to street main or septic tank, for conductor lines from downspouts, storm drains – and other non-pressure uses outside the home. Use Orangeburg Perforated Pipe for septic tank beds, foundation drains, all seepage drainage.

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Famous Taperweld Joints seal water-tight and root proof with a few light taps of the hammer. No unsanitary leaks–no over burdening infiltrations.

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Light weight 8-foot lengths mean fewer pieces to handle, fewer joints to make. Orangeburg Fittings are made especially for Orangeburg Pipe.

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Low friction losses due to its smooth bore.

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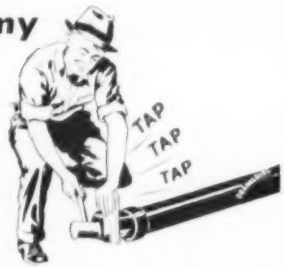
Orangeburg Pipe is strong, tough and resilient. It resists corrosion, acids and alkalies found in sewage wastes – all underground conditions. With Orangeburg the quality is high – the cost surprisingly low.



48 Years Underground

Unretouched photograph from sewer line now in service 48 years and going like new.

An independent investigation of Orangeburg installations by a prominent sanitary engineer has substantiated the fact that Orangeburg is an excellent material for sewage disposal.

A summary of this report will be sent on request. Write Dept. PW 104.

ORANGEBURG FITTINGS INCLUDING THE NEW TEE ARE DESIGNED FOR ORANGEBURG PIPE. THEY SIMPLIFY INSTALLATIONS AND CUT COSTS.

¼ BEND	WYE	⅛ BEND	New TEE now ready

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ORANGEBURG MANUFACTURING CO., INC., Orangeburg, New York

West Coast Plant: Newark, Calif.

Get full details of this month's products . . . mail your Readers' Service card today.

Ind., where he replaces the late Ted Rudgal. I understand that they started the new filter plant just the day before he arrived.

Virgil Langworthy has resigned as Research Chemist of the Chlorine Institute to become a Process Development Engineer with Omega Machine Co. in Providence. Incidentally, Virgil objected to the spelling of his name as "Virgin", the last time he was mentioned in this column. "Virg" told me a story in Seattle about how he had called on the Mayor of Kelso, Wash., and found him cutting meat in his meat market. That's the town where they had a legal hassle over an ozone treatment works.

★ ★ ★

Following the publication of Vol. 3, No. 3 of the Univ. of Fla., Sanitary Engineering Progress Quarterly (that's Prof. Johnny Kiker's house organ), Dr. H. H. Wilkowske of the Fla. Univ. Dairy Lab. wrote John about the practice of registering visitors at the campus sewage treatment plant (1690 persons in 6 years, 98 from foreign countries.)

Wilkowske suggested that "colored campaign buttons reading, 'I visited the sewage plant' should be given to the visitor. "This should create favorable publicity, just like Silver Springs, etc." Wilkowske also pointed out that the dairy department also captures good will by giving samples to the visitors when they leave. Prof. Kiker is studying the implication of the comment.

★ ★ ★

Have You Seen? — The new Cast Iron Pipe News—It's quite different from the old one.

★ ★ ★

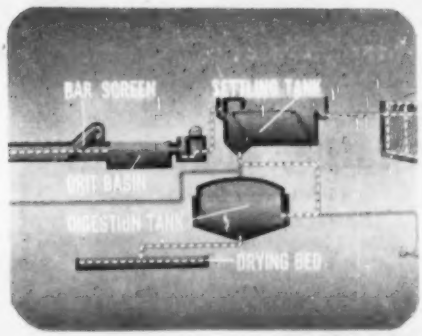
News Notes From Brushy Bend —The 3rd quarterly meeting of the Northwest Ohio AWWA was held on Aug. 4th at Bowling Green, Ohio. Registration was at the plant and cocktails and lunch (Swiss steak, $2.75) were served at the American Legion Hall.

—— In Illinois in October, there will be a water works meeting at Springfield on the 27-28th, and a meeting of the Illinois Municipal League on the 10-12.

—— This column would like to have information on more of these local section meetings.

V.T.Y.—Doc Symons

"CLEAN WATERS"



The 1954 edition of G.E.'s dramatic color movie to be premiered at October meeting of Federation of Sewage and Industrial Wastes Associations

General Electric's full color, sound motion picture, CLEAN WATERS, which forcefully illustrates the dangers of water pollution, has been completely refilmed and brought up-to-date. This public-service film points out the dangers to home, farm, and industry arising from polluted water sources, and outlines a permanent solution to the problem —modern waste treatment.

The original film—first shown seven years ago—was viewed by more than one million people throughout the world and was nationally acclaimed by community and industrial organizations who utilized it in launching campaigns to clean up their water sources.

This dramatic new edition of CLEAN WATERS can be an indispensable tool in helping you promote the increase of adequate sewage and waste treatment. It will be premiered at the annual meeting of the Federation of Sewage and Industrial Wastes Associations in Cincinnati, October 11-14. Be sure to see it. General Electric Co., Section 666-87A, Schenectady 5, N. Y.

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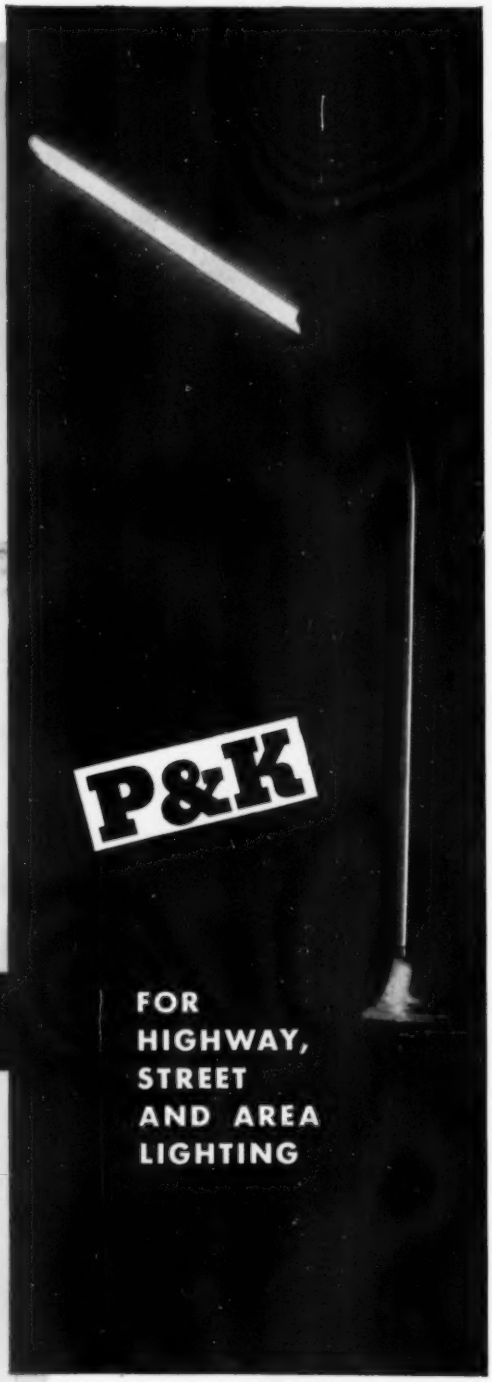
- ADAPTABLE TO EXISTING INSTALLATIONS

ENGINEERS AND OFFICIALS CONCERNED WITH OUTDOOR LIGHTING ARE INVITED TO WRITE FOR FULL INFORMATION.



Pfaff & Kendall

84 Foundry Street
Newark 5, New Jersey

● SLUDGE Disposal Building houses vacuum filters and incinerators; corner of Administration Building at right.

CINCINNATI'S LITTLE MIAMI PLANT . . .

FIRST STEP

IN LONG RANGE TREATMENT PLAN

ARTHUR D. CASTER
Sewage Disposal Engineer,
Cincinnati, Ohio

PROVIDING essentially primary treatment for a raw sewage containing approximately 270 ppm BOD and 250 ppm suspended solids, the Little Miami Sewage Works is designed to handle a peak of 29.0 mgd, the estimated 1980 flow. The present population served is 120,000, the contributing area is 27 sq. miles, and the present raw sewage flow 14.0 mgd. About 85 percent of the flow to the plant is by gravity interceptor, with the remainder from a pumping station through about a mile of force main.

During dry weather periods when the flow in the receiving stream (the Ohio River) is at a minimum, treatment in addition to that provided by plain sedimentation will be obtained by the addition of chemicals and the use of flocculation tanks. Facilities are also provided for chlorination of both influent and effluent.

Sludge solids removed from the settling tanks (and from the flocculation tanks) are digested in floating cover digestion tanks heated with external heat exchangers. Digested sludge is conditioned by elutriation and the addition of ferric chloride, de-watered on rotary vacuum filters, and transported as filter cake to multi-hearth furnaces where it may be dried for use as a soil conditioner, or completely burned and reduced to ash.

● ARTHUR D. CASTER is Sewage Disposal Engineer for Cincinnati.

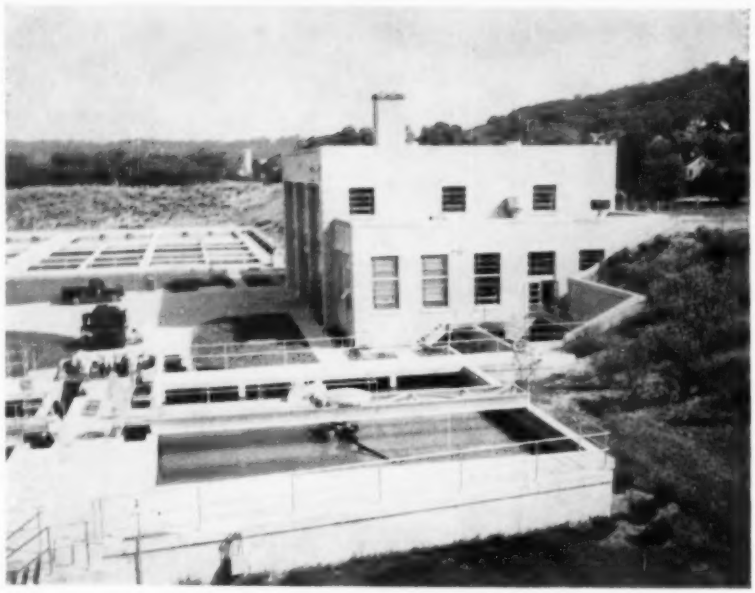
The gas recovered from digestion is used in the sludge heaters, the building space heating steam boilers and in the multi-hearth incinerators.

The Little Miami Sewage Works, which were designed by Havens and Emerson, Consulting Engineers, conforms to the treatment standards established by the Ohio River Valley Sanitation Commission and are designed to accomplish the following:

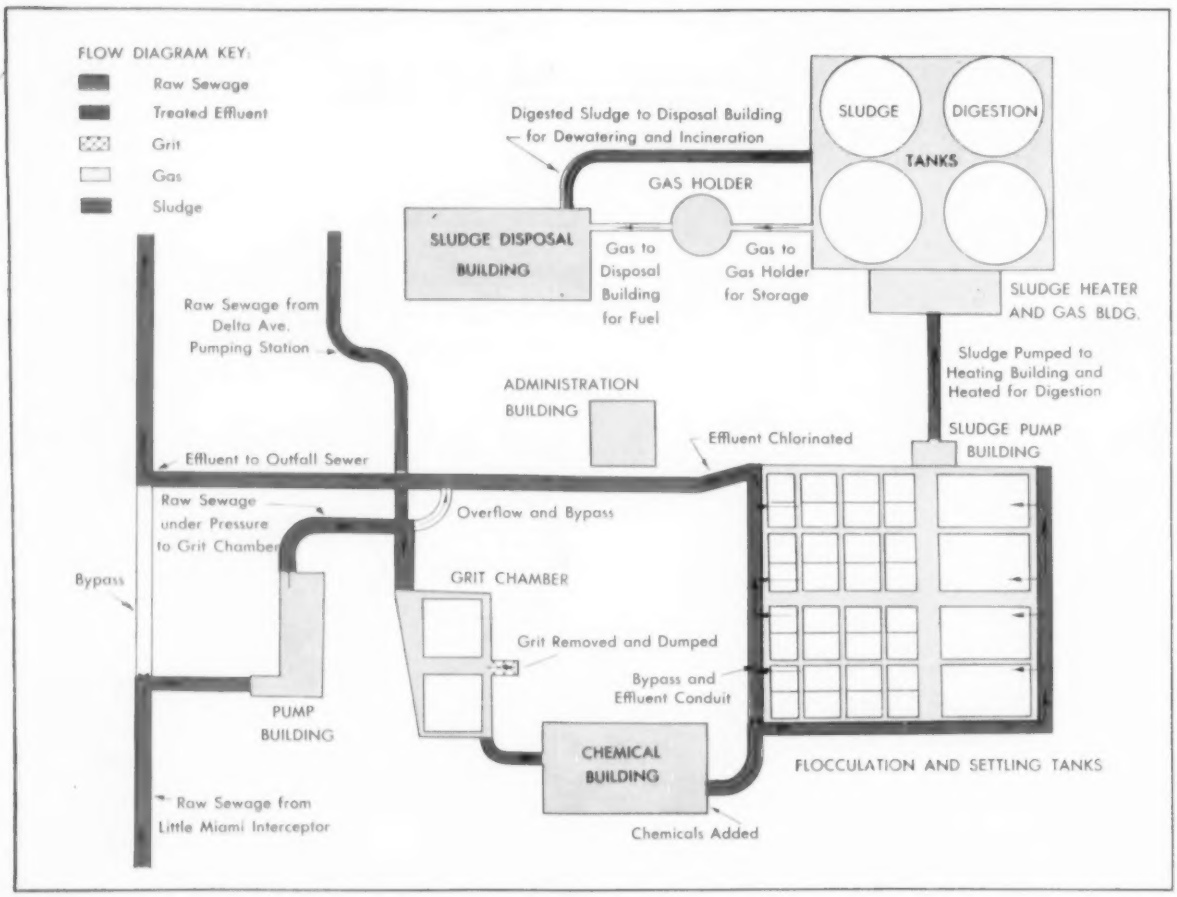
(a) Substantially complete removal of settleable solids; and,

(b) Removal of not less than 45 percent of the total suspended solids; and,

(c) Reduction by not less than 65 percent of the bio-chemical oxygen demand of organic wastes, provided, however, that whenever conditions permit, such lesser degree of reduction of BOD, but not lower than 35 percent, may be applied to organic waste if, as a result, there will be no impairment in the Cincinnati Pool of the Ohio River of



● **CHEMICAL Building is shown at right center; the grit chamber is in the foreground; and a portion of the settling tank structure in the background.**



● **LAYOUT and flow diagram of Little Miami Sewage Treatment Plant. Most of the flow to the plant is through the interceptor at lower left, but some comes from Delta Ave. pumping station line, upper left.**

a water quality standard of 4 ppm of dissolved oxygen at the bottom of the oxygen sag in the Ohio River below Cincinnati.

Plant and Equipment

The principal structures and equipment items of the Little Miami Plant may be summarized as follows:

Administration Building — houses administrative offices and laboratory.

Pump Building—contains the main sewage pumps and electric substation.

Chemical Building—houses chemicals and chemical feeders, blowers, venturi meter, garage, shop, and tool room.

Sludge Heating & Gas Building—houses sludge heaters, gas meters, gas compressors, gas boosters, and water softening equipment.

Sludge Disposal Building—houses vacuum filters and appurtenances, sludge incinerators, and ground drainage pumping station.

Raw Sewage Pumps—five pumps, rated at 15 mgd each against a 32-ft. head, are driven by 100-hp. electric motors.

Grit Chambers — two Detritor units, each 40 ft. by 40 ft. by 2 ft. deep with maximum flow capacity of 86 mgd, with final disposal to land fill.

Screens—manually cleaned coarse bar racks at entrance to wet well; fine screening by comminutors, with three units rated at 30 mgd each.

Venturi Meter—one main flow venturi meter 66 inches by 33 inches, range 8 mgd to 90 mgd.

Chemical Feeders — two gravimetric dry feed machines, each with a capacity of 1000 pounds of alum per hour.

Chlorination — three chlorinators of 4000 pounds chlorine capacity per day each, with two evaporators, and scales for handling ton cylinders.

Blowers—two motor driven rotary blowers to provide 600 cfm of air to the aerated feed channel.

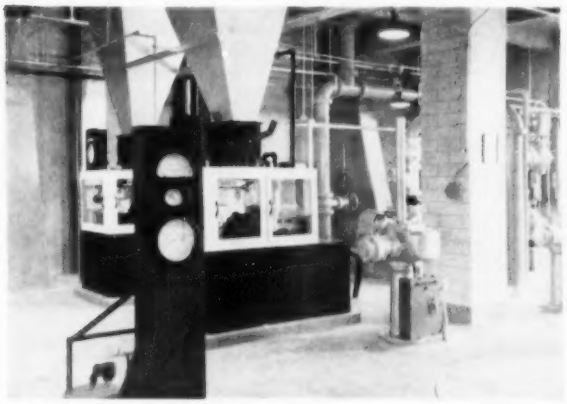
Combination Flocculation-Settling Tanks — flocculation sections, four tanks, each 41 ft. by 61 ft. by 14.75 ft. deep; sludge collection by straight-line collectors; sedimentation sections, four tanks, each 40 ft. by 124 ft. by 12.5 ft. deep, with sludge collection by straight-line collectors.

Sludge Digesters—four tanks with floating covers and gas collection facilities; diameter 65 ft. and depth of side wall 26 ft.

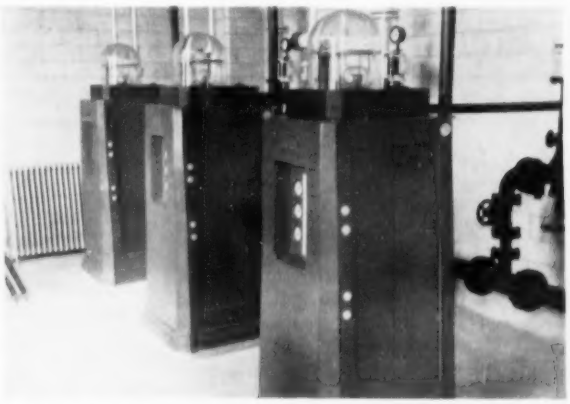
Sludge Elutriation — two tanks, each 12 ft. by 45 ft. by 12 ft. deep for mixing and settling of counter current washed digested sludge.

Gas Storage—one 36-ft. diameter sphere to store 49,000 cu. ft. of gas at 30 psi.

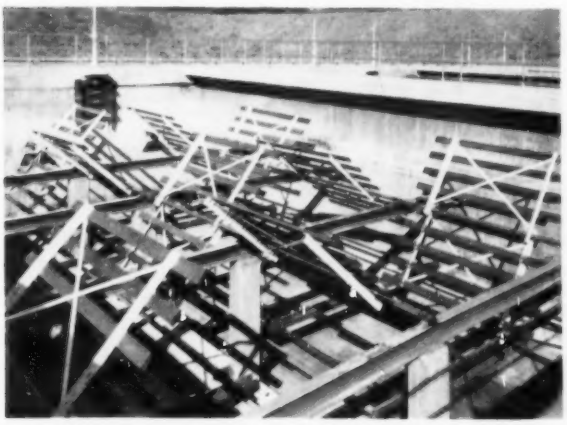
Sludge Conditioning and De-watering—rubber lined tanks for storage and feeding of liquid ferric



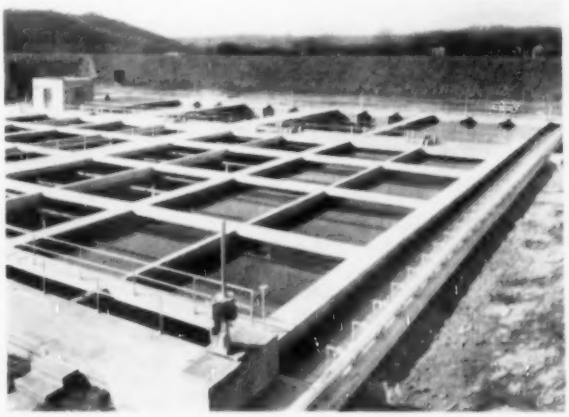
● **DRY FEED** machines, two in number, are of gravimetric type, each with a capacity of 1,000 pounds of alum an hour.



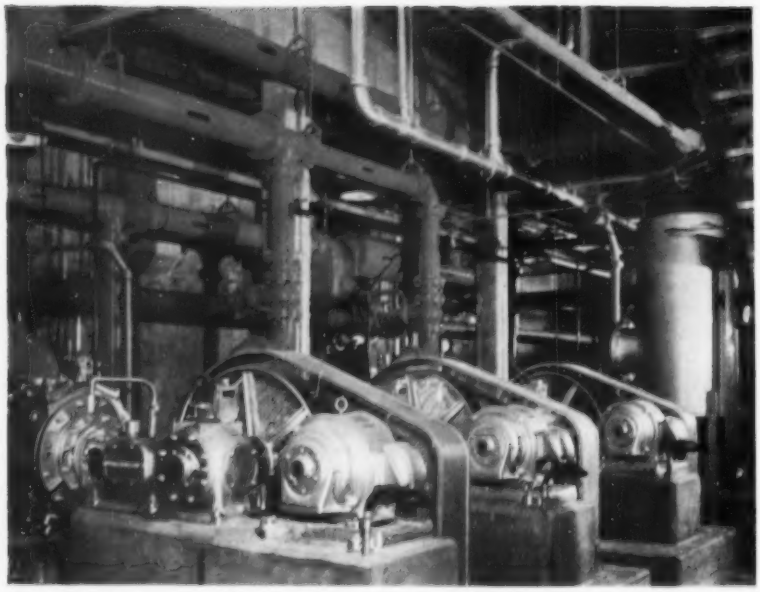
● **CHLORINATORS:** There are three 4,000-pound capacity chlorinators, with evaporators and scales for ton cylinders.



● **ONE OF** the four flocculation tanks. These are 41 ft. by 61 ft. in size and 14.75 ft. deep. Units are in place.



● **SETTLING** tanks are 40 ft. wide and 124 ft. long. The aerated feed channel is shown. Flocculation tanks at rear.



● VACUUM pumps: There are three of these, each with a capacity of 600 cfm of air. Color of pipe lines indicates the material they are to carry.

chloride; four rotary vacuum filters of 150 sq. ft. area each.

Sludge Incinerators—two furnaces, each of daily capacity for handling 45 tons of filter cake having moisture content of 70 percent.

A Long Range Program

The completion and placing into operation of the Little Miami Sewage Works is but the first step of a long range program of sewage disposal for the Metropolitan area of Cincinnati. Presently there is under construction the Mill Creek Sewage Treatment Works, with a capacity of 120 mgd. This will be the largest of the three, or possibly four, plants needed for treatment of all the sewage discharging from the Cincinnati Metropolitan area. This plant is being constructed in separate stages at an estimated cost of $26,000,000 including pumping stations and intercepting sewers. It will furnish treatment for approximately 80 percent of the total sewage flow of the Cincinnati Metropolitan Area.

The cost of constructing, operating and maintaining the entire sewage disposal program is being financed by a sewerage service charge with an additional surcharge levied against those who discharge to the sewerage system a waste which is stronger than that designated as "normal sewage" for the Cincinnati area. Cincinnati and 23 political subdivisions are included in the Program which is under the immediate direction of Arthur D. Caster, Sewage Disposal Engineer for the City of Cincinnati, and is the general responsibility of C. A. Harrell the City Manager. The working agency is the Sewage Disposal Section of The Department of Engineering. This Section is responsible for the management; overall problems of design; consultation on construction; operation; and maintenance of sewage treatment plants, pumping stations, intercepting sewers and regulators; and is also charged with billing investigations for the sewerage service charge.

The Section is composed of 82 employees, with 17 additional employees in the Commercial Division of the City of Cincinnati Water Works. The operating personnel for The Little Miami Sewage Works consist of 32 employees; the Mill Creek plant will utilize 70 employees. The Metropolitan Sewage Disposal Program is comprised of 24 communities in Hamilton County with a drainage area of 216 square miles serving approximately 700,000 people with a population equivalent, due to industrial waste, of 3,000,000 people. The program contemplates $47,000,000 for the construction of four sewage treatment plants as follows: Little Miami Sewage Works, 29 million gallons, $5,000,000; Mill Creek, 120 million gallons, $22,000,000; Anderson Ferry, 5 million gallons, $2,000,000; and Muddy Creek, 5 million gallons, $2,000,000. In addition, eight pumping stations, main sewers intercepting over 100 sewers carrying sanitary sewage and the necessary regulators for regulating storm flow will cost $16,000,000. The program will be financed by the sewage service charge based on the amount of sewage entering the receiving sewer.

The Little Miami plant was constructed at a cost of $6,000,000. James McHugh Construction Co. of Chicago was the general contractor. David P. Backmeyer is superintendent of the plant. C. A. Harrell is City Manager of Cincinnati; T. J. Montgomery is City Engineer; and C. M. Bolton Construction Engineer.

● DUMPSTER unit, provided for handling refuse and other solid wastes from the plant area, is example of care taken in planning and operation.

CAMOUFLAGED PUMP STATIONS *for* Residential Areas

ALAN W. FARRANT
Photographs by the Author

A HIGHLY successful way of hiding pumping equipment has been developed by San Bernardino, Calif. For pumping stations in residential areas, an apparently normal and regular house is built. The original camouflaged house covers a 20-inch well 523 ft. deep and encloses a reservoir with a storage capacity of 97,000 gals., a 75-hp Peerless deep well turbine pump and a 75-hp Fairbanks-Morse booster pump.

With the typical house, it is a case of "when is a house not a house?" Although only a shell, the camouflaged pumping stations are very attractive to the eye. Beautiful in design, they are landscaped with velvety lawns, attractive hedges, shrubs and trees. They are the pride of the neighborhood, and rightly so.

Policy in respect to this kind of construction is outlined in a letter to the Editor by L. A. Hosegood, Superintendent and Chief Engineer of the San Bernardino Water Department, as follows:

● **HEDGES and lawns are just as nice as any in the neighborhood.**

"We have in operation twenty pumping stations, some of which are within the city and others in outlying territory. The policy we now have in our construction program is that any pumping plant located in or adjacent to a residential district will be designed and constructed similar to the type of architecture in that vicinity. We have, at present, three such pumping stations which are producing 15 percent of the total water produced in the city."

In addition to the original structure, which was built in 1939, another house-pump station is used to house a 20-in. well 700 ft. deep. It contains a 100-hp F-M turbine pump, two 100-hp booster pumps (a F-M and a DeLaval) and a 108,000-gal. reservoir. The newest of these stations, constructed last year, has a 75-hp Byron Jackson booster pump. In a shed at the rear is a 75-hp Peerless turbine pump. This shed is unique for two reasons. First, it has far more eye appeal than a shed—in fact, it is a credit to the appearance of the community. Second, the top part is so constructed that it can be rolled away from the concrete floor slab. Thus the equipment can be readily worked on; and when the work is finished, the shed is rolled back into place and the overhead door closed and locked.

Any one of these three structures would make a grand home—as viewed from the outside. Inside it is a different story; there is very little resemblance to a house—no cupboards, no curtains, no rugs, no dishes. And no housewife!

The buildings are constructed of concrete, strongly reinforced. To lessen the noise caused by the op-

● **THE CITY of Bernardino is rightfully proud of this fine pump station.**

eration of the equipment, all ceilings and some walls have acoustical boarding. As a result, anyone out on the sidewalk has to listen carefully to know if the units inside are in operation.

Operation of these plants is simple. Each one has a clock control for starting and stopping the various units, thus almost eliminating operating attention. Inspectors check each station twice a day, and during the hot summer months, they are often looked at the third time.

In regard to the switch controls, storage reservoirs and "roller type" buildings, Mr. Hosegood goes into some more details:

"The pumps and the water level in the storage-suction reservoirs which are located within the buildings are controlled by electrical float switches which are operated on a time clock schedule. The electric clock can be adjusted to start and stop the pump at any time and is fully automatic. In two of the pumping stations the water well and the pumping equipment are located within the building, together with the horizontal booster equipment. We have found from experience that by locating the well and the deep well turbine in an adjacent building, which is constructed to resemble a garage, the arrangement is more adaptable for cleaning out the well or making any repairs to the pumping equipment. By opening the garage door and by means of the rollers, we can move the 'garage' away from the site of the work.

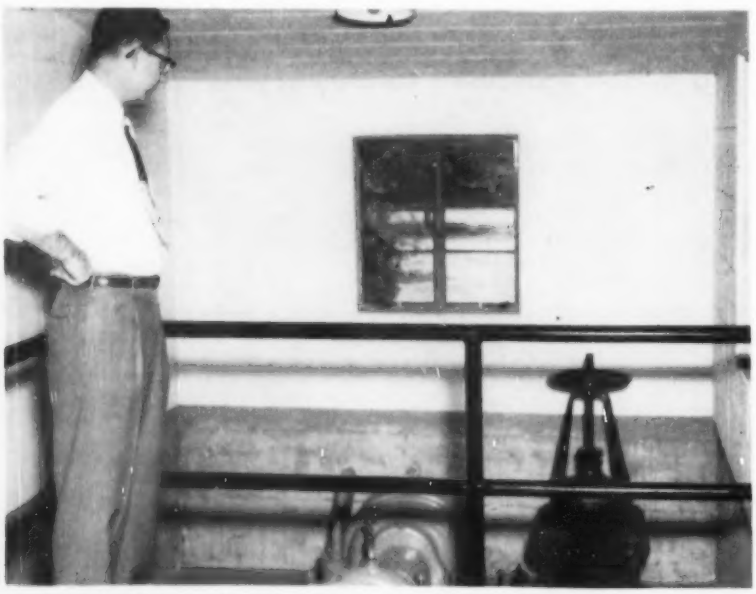
● **PUMP is located in attractive shed with overhead door.**

However, we still have the booster pump located within the reservoir building, together with all electrical controls.

"The suction storage reservoir into which the well water is discharged is approximately 30 ft. by 50 ft. by 12 ft. deep. This reservoir serves two purposes: First, it acts as an equalizer basin for the control and operation of the booster pump; and, second, it is a settling basin which prevents discharge into the mains of any sand that may be drawn from the well."

The housing of the equipment in this manner is entirely satisfactory to everyone. Says Jim Paulin, Water Department employee: "In all these years we have never had any sort of a complaint, from residents or from our own employees. Our men take pride in the appearance of these stations. For pumping, we use electricity exclusively, which helps cut down on the noise. Our department employees are in charge of the yards and see to it that flowers, shrubs and paint on the buildings are in keeping with the rest of the houses in the neighborhood."

The Water Department gets compliments from both customers and strangers—on the neat and attractive appearance, on the lack of noise and on the uniqueness of the idea. Yes, the City of San Bernardino can take a bow.



● **ACOUSTICAL boards reduce noise. Jim Paulin inside one of the "houses."**

• • •

Minneapolis Installs Emergency Generators

Emergency generators have been installed at two Minneapolis fire stations where main radio transmitter receivers and auxiliary transmitter receivers are located. The main and auxiliary transmitters are controlled remotely from headquarters consoles by fire alarm underground conductors. One of these is an Onan air-cooled unit which will provide 10,000 watts, 60-cycle, 120/208 volt, 3-phase, 4-wire electric service. It is equipped with a dual transfer control which will automatically start the generator set in the event of power interruption on either or both the incoming lines, and will automatically stop the unit when commercial service is resumed.

The engine-driven generating plant is normally operated on city gas, with gasoline as a standby fuel in event of city gas failure. Both standby units are tested each week by trained linemen and radio technicians, and a log is kept by them.

• • •

City Proposes Car Tax to Finance Freeways

A proposal has been advanced in Houston, Tex., to charge a licensing fee of $7.50 for passenger cars and $15 for trucks to finance the construction of the remainder of the proposed freeway system. A network of freeways, totalling about 200 miles, is considered essential for the growth and development of the city, and about 40 miles have been built. Completion of the remainder will cost about $375 million dollars, of which local interests must raise about $200 million.

● PAVEMENT has been widened from 24 ft. inside curbs to 34 ft. Beyond the intersection in the background is a portion of street to be widened later.

● POLICE and Fire vehicles in center of street were staged for this photo, but parking conditions are typical.

New Ideas in STREET WIDENING

Produce Economical Results

LINAS H. BROWN

Chief, Municipal Department

DeLeuw, Cather & Company

THE existing concrete gutter becomes part of the pavement base and the new gutter is part of the pavement surface under a design for street widening and resurfacing which has been used successfuly in Cicero, Illinois over the past ten years.

In widening existing 24-ft. and 28-ft. pavements to 34 ft. or 36 ft., the new integral curb and gutter on each side of the street extends to the back of the old curb. The area between the new Portland cement concrete gutters is resurfaced with high grade bituminous concrete. The pavement crown is reduced and the drainage is improved by the elevations of the new curb and gutter and by the varying thicknesses of Class "X" concrete, bituminous concrete binder and leveling binder. Class "X" is an Illinois Highway Department designation for a PC concrete having a maximum aggregate size of 1½ ins. with 95 percent passing a 1-in. sieve.

The first phase of construction is the cutting of the existing curb. The curb breaks off quite easily when cut by a pneumatic bull point. A crew of three, exclusive of truck driver and rubble loaders, have been able to complete 1,200 feet of curb cutting in one day. New inlets, catch basins and drain pipe may be constructed concurrently with cutting of curb. The new concrete curb and gutter with gutter flags 3 ft. to 5½ ft. wide is reinforced with pavement fabric weighing 78 or 80 pounds per 100 square feet. Construction is carried around the new drainage structures and the utility frames which have been adjusted or reconstructed to grade. Class "X" concrete and/or butuminous concrete binder and leveling binder are placed inside the toe of the new gutters to build up the new pavement. The specifications require the contractor to reshape the area over the old pavement, curb and gutter to elevations within approximately 0.10 ft. of the final design.

The final construction procedure is the laying of the bituminous concrete surface course. Elevations shown on the plans coincide with

● **COMBINATION curb and gutter as completed, with 3½-ft. gutter flag. By the method described in this article, old street can be used for local traffic during construction.**

● **PLACING combination concrete curb and gutter, a part of the widening process. In the background is shown a "Scootcrete" used for carrying form materials and concrete.**

the adjustable screed points of the bituminous paving machine in order to effect a cross section approximating a 20-ft. parabolic curve down the center of the new pavement.

Variation in Design

One variation in the widening design which uses the old curb and gutter as part of the base is especially applicable when the pavement is widened and resurfaced with a greater width added to one side than to the other. One such improvement is Central Avenue in River Forest, a Chicago suburb.

Central Avenue formerly consisted of a brick surface on a 6-in. macadam pavement between concrete curb and gutters 21 ft. 6 ins. face to face. Its crown varied from 6 to 14 ins. The 6-block portion which was improved began at Harlem Avenue, State Route 42-A, and terminated at Lathrop Avenue. Intervening streets terminate at Central because of the Chicago and North Western Railroad main line tracks, which are elevated and contiguous with the south line of Central Avenue.

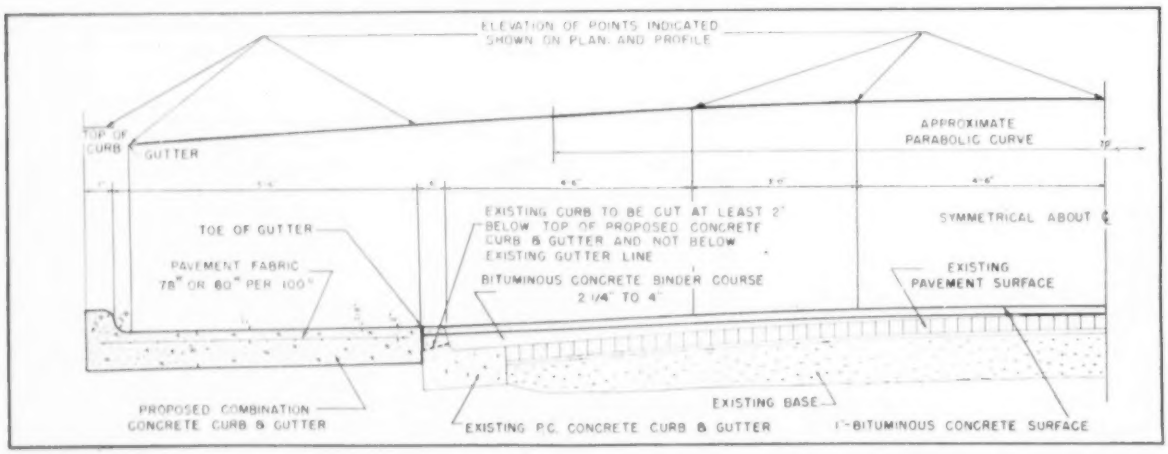
Central Avenue serves River Forest's two largest business establishments, the Bowman Dairy Company's huge bottling and distributing plant and Wieboldt's, a department store covering an entire block of this fashionable west side suburb. The Bowman plant required that Central Avenue pavement have structural strength to withstand tank trucks weighing up to 20 tons. Wieboldt's 600-car parking garage dictated that Central Avenue be wide enough to handle the mass of shoppers' cars which supplement the normal arterial street traffic. To provide for these structural and functional requirements, Central Avenue was widened to 41 ft. in the block fronting on the Wieboldt parking structure (no parking allowed) and to 32 ft. for the remaining five-block section (limited parking on north side only).

A 9-inch PCC base was constructed between the back of the old curb and new curb and gutter with a standard 12-inch gutter flag. On account of limited street width (50 ft.) and the C. & N. W. R. R. retaining wall (along the south street line), most of the widening was on the north side. This unsymmetrical widening shifted the centerline 5½ to 6 ft. north of the old centerline.

Inlets and catch basins were added. The new cross section presented a surface, the elevations of which were from 2 to 9 ins. over the surface of the old brick pavement. The proposed surface was a uniform 2 ins. over the new PCC base. At most places, the old curb elevation was 2 ins. or more below the proposed surface. Where it was less than 2 ins., the contractor knocked off the curb after pouring the new PCC base.

Pavement Construction

Class "X" Portland cement concrete was poured over the old brick surface to a minimum thickness of 2 ins. and to a maximum depth to bring it within 2 ins. of the proposed finished pavement surface. The consulting engineer's field personnel worked with the contractor's men in setting 2x4's nailed to the old brick base. These 2x4 strips made irregular outlines between areas of brick pavement which were covered with


ELEVATION OF POINTS INDICATED SHOWN ON PLAN AND PROFILE
TOP OF CURB
GUTTER
APPROXIMATE PARABOLIC CURVE
TOE OF GUTTER
PAVEMENT FABRIC 78" OR 80" PER 100'
EXISTING CURB TO BE CUT AT LEAST 2" BELOW TOP OF PROPOSED CONCRETE CURB & GUTTER AND NOT BELOW EXISTING GUTTER LINE
BITUMINOUS CONCRETE BINDER COURSE 2 1/4" TO 4"
SYMMETRICAL ABOUT ℄
EXISTING PAVEMENT SURFACE
PROPOSED COMBINATION CONCRETE CURB & GUTTER
EXISTING P.C. CONCRETE CURB & GUTTER
EXISTING BASE
BITUMINOUS CONCRETE SURFACE

● **HOW existing curb is removed, new concrete combination curb and gutter installed and new surfacing placed.**

Class "X" concrete, and areas of brick on which the bituminous concrete leveling binder was laid directly.

Pavement was completed by constructing the bituminous concrete surface. This consisted of a fine, dense-graded aggregate type of leveling binder having a minimum aggregate gradation of ½ in. and with 55 to 70 percent passing ½-inch sieve and retained on No. 10 sieve (Illinois Highway Department Subclass I-11). Leveling binder material was first laid by hand along the edges of the Class "X" Portland cement concrete, feathering out on the brick. A Barber-Greene finishing machine then laid leveling binder to a minimum thickness of 1 inch, covering the entire pavement area. A 1 to 1⅛-inch surface or wearing course completed the widened and resurfaced pavement.

This project, which was constructed in the summer of 1950 has stood up excellently with no signs of rutting or shoving of the bituminous concrete and no expansion or contraction problems resulting from large areas of Class "X" concrete. Graceful elm trees 8 to 46 ins. in diameter have survived, thanks to the care of the Bowman Dairy Company, the contractor, and Village of River Forest personnel.

The general contractor was the Standard Paving Company of Chicago. The writer was designer and project manager. Dan S. Kent was field engineer for De Leuw, Cather & Company, consulting engineers of Chicago.

Economics in Design

In utilizing the integral curb and gutter with wide gutter flag, the concrete base and the bituminous concrete covering this base are eliminated. In the four tables herewith, a comparison is made on the basis of one linear yard of pavement between: (1) A new 36-foot Portland cement concrete pavement 9 ins. thick to replace an old pavement; (2) the existing pavement widened by removing the curb and gutter and constructing 8-in. PCC base with conventional curb and gutter; (3) the existing pavement widened by constructing 8-in. PCC base, utilizing the old curb and gutter as part of the base to be resurfaced (same as above for River Forest); and (4) widening with integral curb and gutter with wide gutter flag and resurfacing only over old pavement, curb and gutter.

Table 1—Cost for New PCC Pavement with Old Pavement Excavated

Item	*Unit*	*Quantity*	*Unit Cost*	*Cost/yd.*
Earth Excavation	Cu. Yd.	1.4	$2.00	$ 2.80
Remove Existing C & G	Lin. Ft.	6	.75	4.50
Pavement Removal	Sq. Yd.	7⅓	1.00	7.30
PCC Curb and Gutter	Lin. Ft.	6	2.80	16.80
PCC Pavement—9-in.	Sq. Yd.	10 2/3	6.50	69.40
Pavement Fabric	Sq. Yd.	10 2/3	.85	9.10
Total cost per lineal yard				$109.90

Table 2—Cost for Removing Curb and Gutter, Placing New Base Between New Gutter and Existing Pavement

(Two ft. of pavement assumed lost on each side of street due to sloughing off of old bricks and base.)

Item	*Unit*	*Quantity*	*Unit Cost*	*Cost/yd.*
Earth Excavation	Cu. Yd.	1.7	$ 2.00	$ 3.40
Remove Existing C&G	Lin. Ft.	6	.75	4.50
PCC Curb and Gutter	Lin. Ft.	6	2.80	16.80
PCC Base—8-in.	Sq. Yd.	4 2/3	6.00	28.00
Pavement Fabric	Sq. Yd.	4 2/3	.85	4.00
Bituminous Prime Coat	Gallon	1	.30	.30
Binder over base—1-in.	Tons	.156	12.50	2.00
Surface Coat 1-in.	Tons	.156	12.50	2.00
Bituminous Binder	Tons	.41	12.50	5.10
Bituminous Surface	Tons	.33	12.50	4.10
Cost per lineal yard				$70.20

Table 3—Cost for Cutting Existing Curb and Placing New Base Between New and Old Curb and Gutter

Item	*Unit*	*Quantity*	*Unit Cost*	*Cost/yd.*
Earth Excavation	Cu. Yd.	1.7	$ 2.00	$ 3.40
Cutting Existing Curb	Lin. Ft.	6	.50	3.00
PCC Curb and Gutter	Lin. Ft.	6	2.80	16.80
PCC Base—8-in.	Sq. Yd.	2⅓	6.00	14.00
Pavement Fabric	Sq. Yd.	2⅓	.85	2.00
Bituminous Prime Coat	Gallon	1	.30	.30
Binder over base—1-in.	Tons	1.28	12.50	1.60
Surface Coat—1-in.	Tons	1.28	12.50	1.60
Bituminous Binder	Tons	6.85	12.50	8.60
Bituminous Surfacing	Tons	4.57	12.50	5.70
Cost per lineal yard				$57.00

Table 4—Cost for Cutting Existing Curb and Widening with Integral Curb and Gutter with 5½-ft. Gutter Flag

Item	*Unit*	*Quantity*	*Unit Cost*	*Cost/yd.*
Earth Excavation	Cu. Yd.	1.7	$ 2.00	$ 3.40
Cutting Existing Curb	Lin. Ft.	6	.50	3.00
PCC Integral C&G	Lin. Ft.	6	4.30	25.80
Pavement Fabric	Sq. Yds.	3⅓	.85	2.80
Bituminous Prime Coat	Gallon	2/3	.30	.20
Leveling Binder	Tons	6.6	12.50	8.20
Bituminous Surfacing	Tons	4.4	12.50	5.50
Cost per lineal yard				$48.90

Public Health IN SEWAGE Factors

FRANK D. WRAIGHT,

Chief, Sewage Disposal Section,

Division of Sanitary Engineering,

Indiana State Board of Health

A SEWAGE treatment plant, existing for the sole purpose of treating sewage, is a protector of the public health and this fact provides the basic considerations governing the design, construction and operation of any sewage treatment plant. Surface waters are safe for human use only when they are free from sewage pollution. Consequently, a receiving stream must be studied carefully to determine its use and how such use may be affected by the discharge of sewage. This study must take into consideration the expected duration and frequency of minimum stream flows since these are major factors in establishing the degree of sewage treatment required. It is imperative that the sewage treatment plant designer, the builder, and the operator fully appreciate the factors pertaining to public health in order that the completed plant is able to and does perform the job for which it is intended.

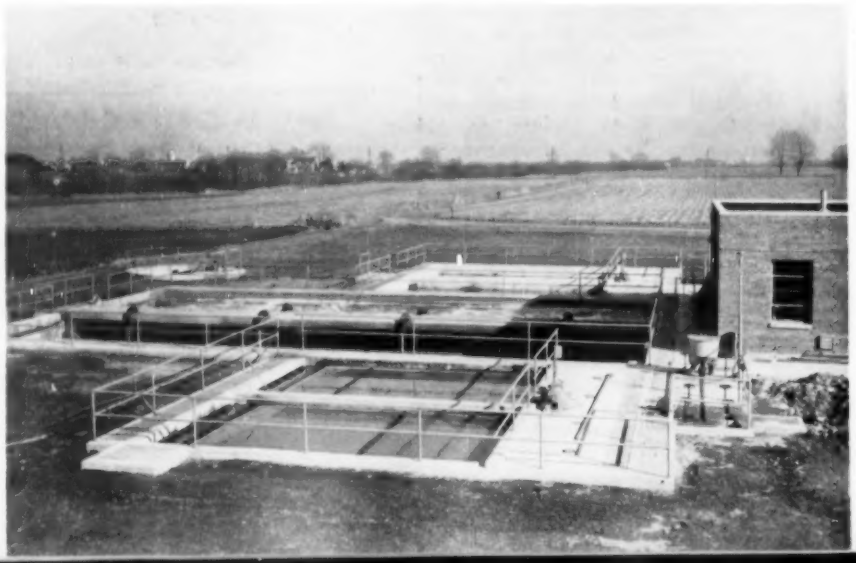
It is not the intention of this article to set forth design standards but rather to point out some of the factors in sewage treatment plants that may have a bearing on plant performance, and to suggest means of improvement. While some of these may not have a direct effect upon public health, anything which may adversely affect or hinder good plant operation is, in a sense, a detriment to the health of a community.

Plant Site

Topography is of major importance in selecting a sewage treatment plant site; but it is not the only factor. Population growth and community expansion should be considered also. During the decade 1940-1950 municipal areas and populations increased more rapidly than had been anticipated by sewage treatment plant designers in the 1930's; consequently, plants only a few years old have become grossly overloaded or are poorly located with respect to the areas they serve. There does not appear to be any sure formula for predicting such population and community growths as occurred in the 1940's; however, a municipality generally can provide a site that lends itself to future plant expansion and provides some insurance against unpredictable growth.

The location of the site with respect to adjacent property may have some public health significance because flies and rodents are often a problem; however, good plant operation and good housekeeping will reduce such hazards. Even though a sewage treatment plant is well operated, there are times when objectionable odors are present; therefore, it is desirable that it be located as far from habitations as practical and with consideration given to the direction of prevailing winds.

The possibility of flooding by high stream levels must be considered when selecting a plant site. If economically possible, all units should be above any previous maximum flood level; or protective devices, such as levees and backwater gates, should be provided to prevent damage to the plant and equipment as result of flooding. It is sometimes economical in the case of small plants to permit periodic flooding of certain plant units with provisions to remove quickly equipment which may be damaged. However, in addition to the economics involved, the designing engineer must consider the possible adverse effects upon the receiving stream, not only as a result of bypassing during the flooding period but also during the time required to place the plant back into operation; generally this practice cannot be recommended. Even



● **LOCATION factors: The Crown Point activated sludge plant is well drained and placed away from houses.**

TREATMENT PLANT DESIGN, CONSTRUCTION and OPERATION

though bypassing during flood stage may not be harmful so far as organic load on the stream is concerned, bacterial pollution may be serious.

Screens and Grit Chamber

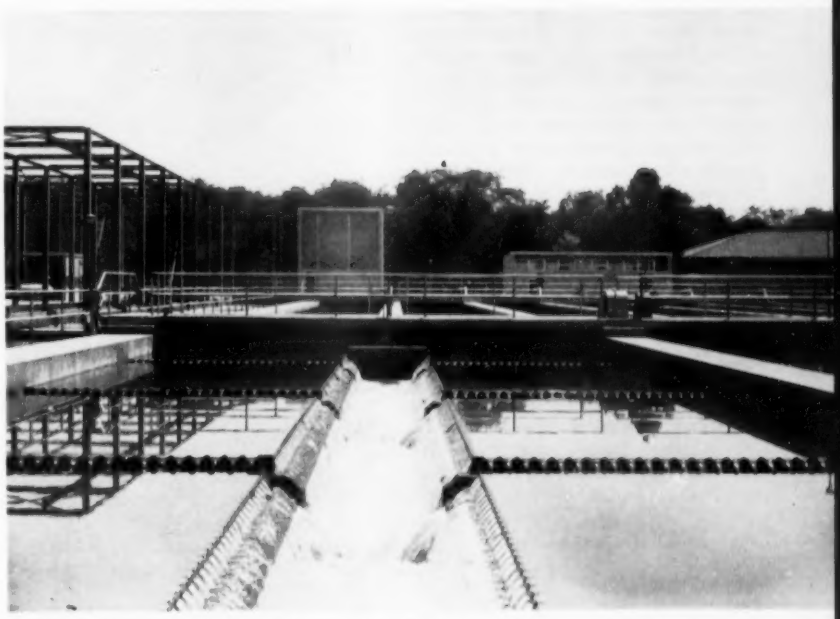
The most desirable method of screening disposal is by grinding and return to the sewage flow; however, since some plants are not equipped to do this, screenings must be removed from the bar screens by hand and disposed of. In order to facilitate handling, arrangements should be made to rake the screenings from the bar screen directly onto a drainage platform; and after being allowed to drain these should be placed in a tightly covered container for subsequent proper disposal by burial or incineration.

Hand cleaned bar screens are subject to clogging, causing the screen chamber and perhaps the incoming sewer to flood. A means of bypassing the screen, but through the plant instead of to the receiving stream, is good practice. In the case of hand cleaned bar screens located below ground, the screen should be readily accessible and means be provided to elevate the screenings mechanically. Overhead space is necessary so that a rake can be used without interference.

Grit in itself will not create an insanitary condition; however, it will contain considerable organic material, which requires special precautions in handling and disposal to prevent odors and attraction to flies. Such problems can be minimized by providing grit washing equipment which can produce a fairly clean grit.

Settling Tanks

The most economical and simple means of removing solids from sewage is by settling; however, an unsatisfactory settling tank can become a hindrance rather than aid to good treatment. After solids have settled, they should be collected and removed from the tank before decomposition starts. The operation schedule of the sludge collecting mechanism is best determined by experience, but it should be frequent enough to avoid septicity and to prevent accumulations of solids from placing excessive loads on the mechanism. Many operators have good results by operating continuously although some feel that this causes undue wear and so operate the collectors intermittently. Collector flights are designed to remove all solids to a hopper for subsequent removal. However, care must be taken to install the equipment initially so that it will not bind on the tank wall or bottom; and the scrapers must actually drag the tank bottom so that not even a thin layer of sludge is allowed to accumulate.



● **TREATMENT plant of Indianapolis Sanitary District is example of good operating practice. This view shows the primary settling tanks and the effluent weirs.**

Almost every treatment plant receives oil, grease or other floating material which can be skimmed from the primary tank and disposed of, provided arrangements for skimming have been made. Whether hand operated or mechanical skimming equipment is used, the floating material is unsightly, often odorous and attractive to flies. Skimming troughs, large enough for an operator to get a scrubbing brush into, will facilitate cleaning. Good design will include a pit or sump to which skimmings are drained for subsequent disposal to the digester; however, every effort should be made by the operator to prevent mineral oil, and any other material which will interfere with digestion, from being pumped to the digester. Such material can be removed to a suitable disposal area for burning or burying.

Sludge withdrawal facilities should be of such type and so located that the operator can observe the sludge as it is withdrawn from the hopper. This permits an immediate estimate of the quality of sludge. In addition, the operator should be able to control the rate of withdrawal so that only thick sludge will be withdrawn and the amount of water kept to a minimum.

Imhoff Tanks

Many Imhoff tanks have been designed with insufficient sludge holding capacity, resulting in a sludge handling problem. The designer must keep in mind that no

means of heating sludge is available and that sufficient capacity to permit withdrawal of well digested sludge from three to six times per year is necessary. Sludge removal must be controlled in order to prevent a build-up of the solids under the slot at the bottom of the flow-through channel and to make certain that sufficient capacity is available at the start of the winter season during which time digestion takes place slowly. Determination of the sludge level may require some ingenuity on the part of the operator inasmuch as such facilities are not normally a part of the original design, though they probably should be. A sounding line with a flat weight suspended horizontally or a pitcher pump with an adjustable suction line will do the job. Sludge at the drawoff point is usually heavy and will move rather slowly; in order to prevent an excess of sewage from being discharged to the drying beds, sludge must be withdrawn slowly. Usually an Imhoff tank has more than one sludge hopper. Due to the fact that most settleable solids will deposit rather quickly after entry into the tank, distribution of sludge over the bottom of the tank will be uneven and Imhoff tanks designed to permit reversal of flow will help this situation.

Scum control on the surface of the gas vents is a matter of operation. The tank should be designed so that the water level is close enough to the top to be within easy reach of the operator. A railed walkway constructed along the gas vents will facilitate this operation. Collections of scum in the gas vents provide a breeding place for flies and may eventually become so thick and hard that a major cleaning job will be necessary.

The flow-through channel bottom is usually constructed with a ratio of at least 1.4 vertical to 1.0 horizontal; however, solids have a tendency to cling to the sloping bottom slabs, become septic and interfere with settling. It is necessary for the operator to clean the bottom of the flow-through channel daily by using a squeegee or similar device to push the solids through the slot. Floating material may accumulate on the surface of the flow-through channel. This requires a skimming baffle to prevent such solids from passing over the effluent weir. Hand skimming is satisfactory for this type of installation.

● **AERATION tanks of the Jasper, Ind., plant, which treats wastes including ground garbage discharged from disposal units in almost every home in the community.**

● **TYPICAL of excellent small treatment plants is this installation at Port Washington, N. Y. Exceptionally high degree of treatment is provided for 3 mgd.**

Aeration Tanks

The aeration tank is the heart of an activated sludge type sewage treatment plant and it must be designed and constructed in such a manner that continuous operation is insured. The first consideration is an adequate supply of air applied to maintain sufficient dissolved oxygen in the mixed liquor. The air supply should definitely be provided by multiple units of such capacity and number that one or perhaps more can be taken out of service without interfering with good plant operation. In addition to multiple units, more than one source of power is essential such as sewage gas and electricity, or oil and gas, or any other combination of fuels which may be readily available.

When more than one blower is connected to a common air header, it is necessary to equip each discharge line with a suitable valve to prevent a reverse flow of air through a blower which may be out of service or stop due to power failure. Such a reverse flow of air can damage a blower and may even be dangerous to the operator.

Air diffuser equipment must produce fine well distributed air bubbles without causing excessive blower pressure. Most diffusers require periodic cleaning to give satisfactory results; therefore, the designer should include the necessary space and equipment as part of the plant service building properly to maintain and clean diffusers.

Another important consideration in the operation of an aeration tank is a means of controlling solids in the mixed liquor. This requires a

return sludge meter as well as adequate pump capacity. It is desirable that the operator be able to observe the sludge as it is withdrawn from the final settling tank. This may be accomplished by means of a sludge return wet well or a sludge division box.

The activated sludge type plant can handle a wide range of waste loads provided the operator is forewarned and his plant is designed to make the necessary adjustments. Sudden and unexpected loads may upset the biological process, and result in a prolonged reduction in plant efficiency and produce offensive odors. In addition, some industrial wastes, such as toxic materials, oil, acids and caustics, will produce adverse effects. Continuous operating control being a major factor in good operation of an activated sludge type plant, it is essential that the designing engineer provide the necessary equipment and facilities.

Trickling Filters

The trickling filter affords a good means of secondary treatment for a city or community, large or small, especially where the receiving stream does not demand a degree of treatment of the highest nature. Trickling filters are capable of absorbing sudden and heavy loads without prolonged upsets and will maintain a consistent efficiency.

Filter flies may be a problem to standard rate trickling filter plant operators and constant vigilance is required when weather conditions are conducive to fly breeding. Filter flooding at periodic intervals and chlorination will aid in fly control and, therefore, provision for these should be incorporated in the design. Care must be exercised that such measures do not destroy the bacterial growth on the media without which the filter is of less value. In the case of high rate filters, filter flies are not usually a serious problem.

The trickling filter plant designer should design the filter in respect to loading and to recirculation, if used, so that the desired effluent can be obtained and maintained. Factors in good trickling filter performance are a suitable underdrain system, providing ample ventilation and drainage facilities; good media, of the proper size—usually 2½ to 4-in.—free from fine material; and a properly designed and erected distributor. Special attention should be given to the placement of the media to prevent stone dust and chips, which collect in truck bodies while hauling, from being placed in the filter. Specifications should require washing of the media and rehandling before placement in the filter. Provisions for flooding should usually be incorporated in the design of low rate filters; and may be provided for high rate filters. Walls should extend about 8 ins. above the stone, except that filters employing the rain-drop method of application should have higher walls. If the filter is in cut, adequate drainage protection should be provided to prevent dirt or debris from washing onto the filter surface. If flows exceeding the capacity of the distributor may occur, an overflow and by-pass should be provided at the siphon chamber. A temporary by-pass between the filter and the secondary settling tank is desirable to avoid washing grit and fine stone to the tank during the first flushing of the filter.

Ordinarily maintenance and operation of a properly designed filter involve few problems. Poor distribution to the surface, with spotty bacterial growths and a reduction in filter capacity, may be caused by clogged nozzles. These should be cleaned regularly. Normal heavy growths on the surface, unless they cause serious ponding, need not cause concern; but rodding or turning over the top several inches of media may be beneficial; in some cases, a high velocity stream of water from a hose may be sufficient. Heavy fibrous growths may result from certain types of industrial wastes and if such growths occur and persist to the point of causing trouble, research to determine the cause should be initiated. Excessive carryover of solids from a settling tank may cause clogging; in such cases, steps should be taken to improve or augment settling facilities.

Digester

One of the most important considerations in digester design is sufficient capacity to permit good sludge digestion before withdrawal from the tank. Since a heated digester can handle up to twice as much sludge as one that is unheated, heat should be provided; or provisions should be made so that heat can be added readily should it become necessary to increase the digestion capacity. With proper temperature control and provisions for recirculation or stirring, crust or scum can be kept at a minimum in a heated digester. Open unheated digesters may produce offensive odors and are excellent places for fly breeding. In such cases, steps must be taken to cover the digester; or, if possible, to control the odor and flies.

Considerable water is pumped to a digester along with the sludge and in the process of digestion, supernatant of varying quality is formed

● **TALLMANS' Island plant, New York City, is typical of one of the fine large installations. Shown are four 83-ft. diameter floating cover digestion tanks.**

which should be removed to maintain as much digestion space as possible. Even so-called good supernatant contains many organisms and is relatively high in BOD and solids content. It will likely produce an adverse effect on the receiving stream; therefore, provision should be made to return this supernatant at a uniform rate into the primary effluent channel.

Accumulation of inert material such as sand, cinders, egg shells and coffee grounds, make it necessary to clean a digester inasmuch as such material not only decreases digestion space but often interferes with heating and digestion. Even digesters for small communities contain much of this sort of waste; therefore, the problem of removal and disposal is one of major sanitary significance. Provision should be made in design for convenient and economical cleaning. A satisfactory means of disposal, if sufficient area is available, is to store the digester contents plus any diluting water that may be necessary to facilitate removal in a lagoon. Such a lagoon should be located to avoid nuisance to any inhabited area; and it should, if possible, have a bottom that will permit excess water to seep away. If the soil is tight, underdrains covered with several inches of gravel or stone and sand may be installed provided the receiving stream will not be harmed by controlled discharge from the lagoon. Most any method of disposal may create a breeding place for insects and an odor problem and will require thoughtful planning.

Gas hazards always exist near a digester and it is imperative that all gas safety devices be maintained in proper working conditions and that explosion-proof lights, switches, and motors be provided where gas may be present. It is useless to provide explosion proof devices in the digester control building and at the same time install a sludge heater with an open flame. The waste gas burner should be located so that, in the event the pilot flame is out, gas can not be blown into open windows or doorways. Gas lines should be well constructed of good materials and the operator should periodically test the lines for leaks and stoppages. Gas lines should always be provided with water traps and drains but pipe misalignment may cause water pockets and prevent free gas flow which in turn may cause excessive pressures and subsequent gas leaks. This condition often occurs when a gas line is laid underground without due regard for settlement, causing the line to sag.

Floating covers must be balanced and float freely to be effective. Rain water, entering through a hole in the roof and collecting on one side of the cover may cause tipping. An unbalanced cover may be corrected by proper placement of weights between the roof and top of the cover. Guide rollers may occasionally slip and allow the cover to ride against the side of the digester wall.

Supernatant drawoff lines and overflow lines are particularly susceptible to clogging and it is necessary that water under high pressure be available for backflushing.

Sludge Disposal

Design and construction of sludge drying beds demands much care if they are to function properly. The location should be such that sludge can be drawn to the beds by gravity and at the same time they should be placed where ground water will not submerge the underdrains. Surface drainage should be directed away from the beds. If practical, drainage from drying beds should be returned to the treatment plant, especially if the receiving stream offers little dilution. In many cases it will be satisfactory to discharge such drainage to the chlorine contact chamber or even to the plant outfall sewer.

Sludge that is not well digested when drawn to a drying bed will not readily dewater which may cause a serious delay in removal of additional sludge from the digester; and may also cause odor and permit fly-breeding. For this reason it is important that sufficient digestion capacity be available and that the operator be able to determine the quality of digested sludge prior to drawing it to a drying bed.

In areas where the soil is porous, such as gravel or sand, it is sometimes practical and economical to construct sludge drying lagoons. Normally the required surface area is twice that used for drying beds and it is important that the water table be well below the bottom of the lagoon and that the retaining levees be sodded or covered with rip-rap to prevent erosion. However, a large area of land is required and odors, insects and rodents may create problems.

Vacuum filtration is growing in favor as a means of dewatering sludge with subsequent disposal by incineration, drying or use as a fertilizer or soil conditioner. In small installations where the failure of the single unit may cause a serious dewatering problem, an alternate method of disposal should be provided. Or, if ample digester capacity is available and a single unit filter is installed which is able to dewater a week's production of sludge in a single day, a standby unit is not necessary. It does not cost much more to install a 200-sq. ft. filter than it does to install one of half or two-thirds that capacity. If the entire unit is mechanized, so that the dewatered cake is discharged directly into a truck, the amount of labor cost saving may be considerable and the use of possibly odorous and insect-producing drying beds can be avoided entirely. With vacuum filters, there is a cost for chemicals, but the labor cost of removing the sludge from drying beds or lagoons is eliminated.

Certain bacteria will survive the digestion process and may become

● **SLUDGE disintegrator can reduce dried sludge to usable form for sale or for application to the grounds of the treatment plant or city parks.**

active when placed in the proper environment. Dewatered digested sludge is generally considered safe for use as a fertilizer; however, not all organisms are destroyed, according to Wright, Cram and Nolan (SWJ, Nov. 1942).

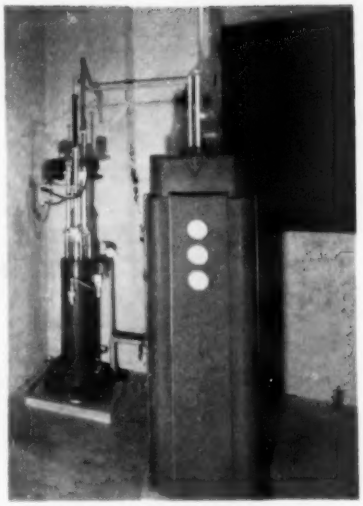
Chlorination

Factors which may determine the need for chlorination include use, temperature, and dilution factor of the receiving stream. Controlling agencies have established bacterial standards; however, in the absence of such standards, the local health authorities should be consulted regarding chlorination needs.

Chlorine can be effectively used by being thoroughly mixed with the already treated sewage during a contact time of 15 to 20 minutes which can be provided by a properly designed contact tank. Provisions should be made to drain and clean the contact tank inasmuch as solids will gradually accumulate on the bottom. This is especially important if only primary treatment is provided.

Pre-chlorination can also be of benefit to plant operation if sewage is odorous or stale as it reaches the plant. Deleterious effects of certain industrial wastes may be at least partially corrected by applying chlorine. The designer of a plant that may be confronted with such problems should provide facilities for prechlorination; and also should install such units as will give the operator maximum flexibility.

Chlorine Handling — A separate room for handling and storing chlorine should be provided at every sewage treatment plant where chlorination is used. The room should be equipped with an exhaust fan in an outside wall near the floor operated by a switch that is accessible without entering the room. The



● **CHLORINATION is important in sewage treatment. It is of special value if only primary treatment is provided, but useful in many other ways.**

room should have a self-closing door and a window to permit the operator to observe the interior prior to entry. No equipment or electrical switches should be installed in the room except those which are necessary to operate the chlorinator. At least two gas masks should be available to the operator and they should be tested periodically for effectiveness.

Pump Stations

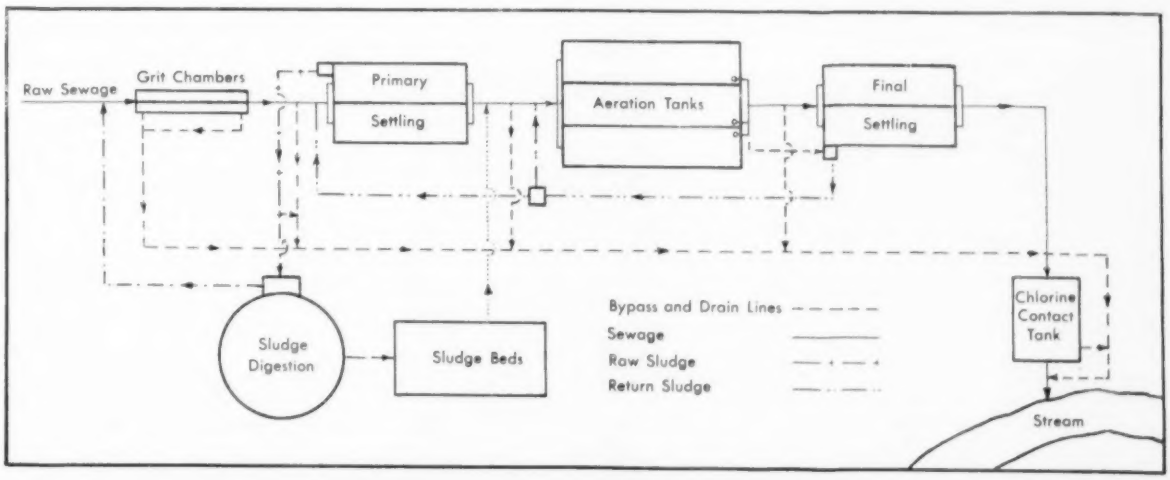
A pump station must sometimes be constructed in a residential area despite objections by residents. Although an above-ground structure suitable for a residential area may be more costly than an underground installation, it is more desirable from the standpoint of operation and maintenance. Suitable standby power and equipment to handle all reasonable emergencies should be provided in the original design.

A pump station is sometimes neglected until it fails to operate and sewage either overflows or surcharges a sewer. Every pump station should be inspected at least once each day to check for unusual pump and motor noises, lubrication needs and clogging of screens. Standby equipment should also be checked and tested periodically. Even with duplicate units and standby power, pump failures may occur and cause considerable damage by flooding; therefore, if practical, an emergency overflow or relief point is desirable. Such an arrangement must be considered for emergency use only and designed so that it will operate surely but only when it is absolutely necessary to prevent flooding.

Water which may accumulate in the lower level of a pump station can be removed by a sump pump with the discharge piping equipped with a check valve and arranged to discharge either to the ground surface or to the wet well above the highest possible sewage level. There have been cases where dry wells were flooded by backflow of sewage through sump pump discharge lines.

If pumps, screens or any other equipment requiring maintenance or inspection are located below the ground surface, mechanical ventilation should be installed and arranged to prevent short-circuiting of air currents. This requires a wide separation between the intake and exhaust ducts. The capacity of the ventilating equipment should be large enough to turn over all the air in the structure within a period

● **FLOW diagram of typical complete sewage treatment plant, with by-pass and drain lines to facilitate operation and maintenance of the various plant units.**



of a few minutes especially if the equipment is to be operated intermittently.

Plant Appurtenances

It is essential that each overflow weir be installed so that the crest is of the same elevation throughout its length. Weirs used to control distribution of the flow require particular attention in order to prevent overloading of plant units. Often the difference in elevation between plant inlet and outlet is small, requiring considerable care in setting weirs in order to prevent flooding or serious bottlenecks in the flow. Adjustable weirs will minimize such error though the amount of adjustment possible is relatively small.

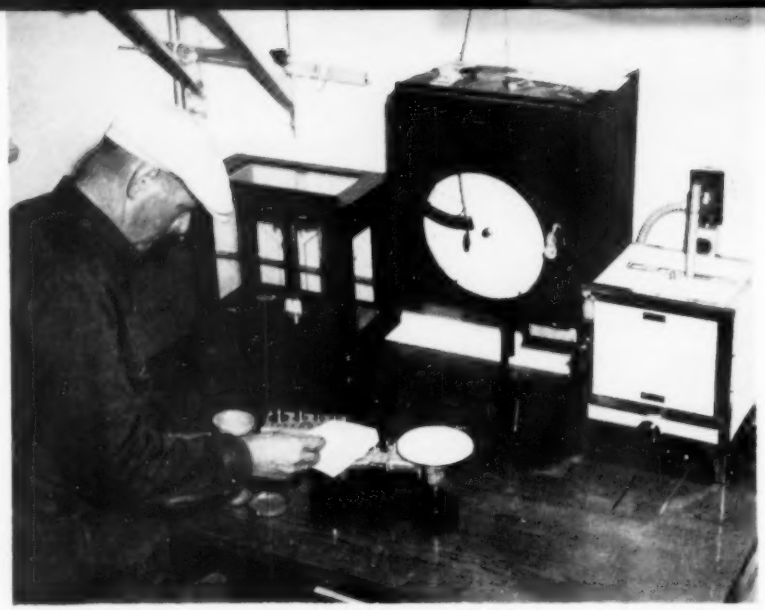
Standby or emergency channels may create offensive and insanitary conditions if not constructed to drain completely after use. Stop gates used to divert flow from a channel must be watertight to prevent sewage from leaking into an unused channel. Channels must have a smooth interior free from ledges and projections which may interfere with the sewage flow and cause solids to be deposited.

It is important that all plant piping and appurtenances be designed and arranged so far as possible to facilitate maintenance and repair. This includes accessibility by means of pipe galleries and adequate working space around unions, meters and valves. Protection from freezing is a requirement in cold climates. It is essential that arrangements be made to dewater piping should it become necessary to open a line.

Pumps essential to continuous plant operation or those necessary to prevent flooding of sewers, building, or plant units should be installed in duplicate and be connected to an auxiliary source of power. Pump intake and discharge lines should be equipped with valves to facilitate removal of the pump without flooding the pump room.

Meters and Flow Controls

Meters are a public health factor in sewage treatment plant operation inasmuch as proper metering and flow control are essential to good plant operation. Where multiple treatment units are employed, it should be possible for the operator to measure and control the flow to each unit. A good rule to follow is that wherever a quantity of flow must be regulated for good plant operation, that flow should be metered. Recording as well as indicating devices are desirable especially for the flow of raw sewage into the treatment plant. Such devices are rather sensitive and easily damaged; therefore, they should be located where they are free from corrosion and excessive vibration and yet can be conveniently read and maintained. After the treatment plant is placed in operation, all meters should be calibrated and tested for accuracy and this should be done periodically thereafter in order to insure dependable metering. Flow meters in a sewage treatment plant are particularly susceptible to clogging. All meter openings and meter piping handling with sewage should be constructed so as to be easily cleaned without dismantling the meter or breaking the connections.



● **SEWAGE treatment plant laboratory is the eyes and ears of the operator. This shows laboratory interior at Seattle-Tacoma airport treatment plant.**

Laboratory

The sewage treatment plant laboratory is the eyes and ears of the operator; without it, plant operation is only a guess. The operator must know how well each unit in his plant is performing and what effect various flows, sewage characteristics and plant controls may have on each unit and on the overall plant efficiency. The extent of the laboratory work to be performed depends upon the type of treatment and the size of the plant.

A well equipped laboratory and chemist are necessary to large sewage treatment plants. Large savings in operating costs can be made by controlled and efficient operation. The small plant will have less use for a fully equipped laboratory mainly because in most cases the operator will not have the time nor training to perform extensive laboratory tests. Nevertheless a laboratory and suitable equipment should be provided and the operator instructed in its use.

The chemist or operator should prepare a form or keep a notebook in which can be shown all computations and laboratory results for each day. He should also record visual observations and events that do not show up in a laboratory test but are important to operation. A monthly summary of data will facilitate comparison and evaluation of results.

Maintenance

Any structure or piece of mechanical equipment is useful only so long as it is kept in service and this can only be done by thorough and continuous maintenance. The job of maintenance starts with design because the designer must consider the cost and economy with which all parts of the plant can be maintained. Maintenance is also of concern to the builder. Mechanical equipment and metal parts are stock piled or installed and exposed to weather, often for periods of several months and it is important that such equipment be properly protected in order that it may be turned over to the municipality in proper working condition.

Even though the treatment plant units may be designed to facilitate maintenance and the builder takes every precaution to protect the plant equipment, the big job falls to the operator. He must remind himself frequently that he is charged with the responsibility of treating sewage at all times and that inoperative equipment will not permit him to do his job. Perhaps the best insurance that an operator can have for continuous operation is an effective pre-

ventive maintenance program which means that equipment must be checked and replaced before there is danger of mechanical failure. This type of program requires a means of keeping records in every item of equipment in the treatment plant from which it can be determined when each items was last checked, what repair was needed, if any, and who performed the work. Preventive maintenance enables the operator to shut down his plant units for repairs at a time when weather and receiving stream conditions are at their best instead of being forced into a shutdown at a time when conditions may not be favorable.

Maintenance records are also helpful in keeping a reasonable inventory of spare parts which should include at least those that are difficult to obtain, those frequently used, and those that may cause a plant shutdown if not immediately available for installation.

Plant Shutdown

Shutting down a sewage treatment plant or any of its units must be considered emergency action and the possible harmful effects upon the receiving stream must be minimized. Plant design should allow for shutdowns of each individual unit without affecting the remainder of the plant. This involves a bypass and a means for dewatering each unit. When possible, multiple units should be provided which will permit at least partial treatment of all sewage during repair work.

Construction of additions to an existing plant may require that the plant be out of service at certain times. This can be minimized by careful design so that new structures can be built without interfering with the operation of existing facilities. It is doubtful that most designers give consideration to probable shutdown times and resulting consequences prior to letting a contract. Such lack of planning may cause the contractor to shut down existing treatment facilities without full regard to the capabilities of the receiving stream. Time may often be saved by prefabrication and installation of the assembled parts as a unit. This type of construction is particularly adaptable to pipe connections, valve installations and others where the assembled parts do not present a handling problem. An important consideration in arranging a shutdown schedule is the probable condition of the receiving stream at the time sewage is to be bypassed.

Future Planning

Sewage treatment plant overloading is a common occurrence due to population growths, industrial expansion and the development and availability of many household appliances which use water and produce sewage. Inasmuch as such growths may occur on rather short warning, it is sound planning to design and arrange every sewage treatment plant to facilitate future expansion.

Industrial growth not only increases the amount of domestic waste to be treated, but may create an additional load due to an industrial waste. Should the sewage treatment plant be unable to treat adequately such an added load, it may be necessary to provide additional treatment, require pretreatment by the industry, or prevent the discharge of industrial waste to the sewer system. Inasmuch as such action is costly and often difficult to accomplish, it is important that planning for new sewage treatment plant construction include a thorough investigation of the volume, strength and characteristics of all existing and contemplated industrial wastes which may be discharged to a municipal sewer and to design the sewage treatment plant accordingly.

Automatic washers, dishwashers and garbage grinders have materially increased the load on municipal sewage treatment plants. Designers of future plants should take the sales trend of such appliances into consideration and determine the possible effects on treatment facilities. An expansion program should be initiated without delay before an overload is actually experienced.

Plant Water Supply

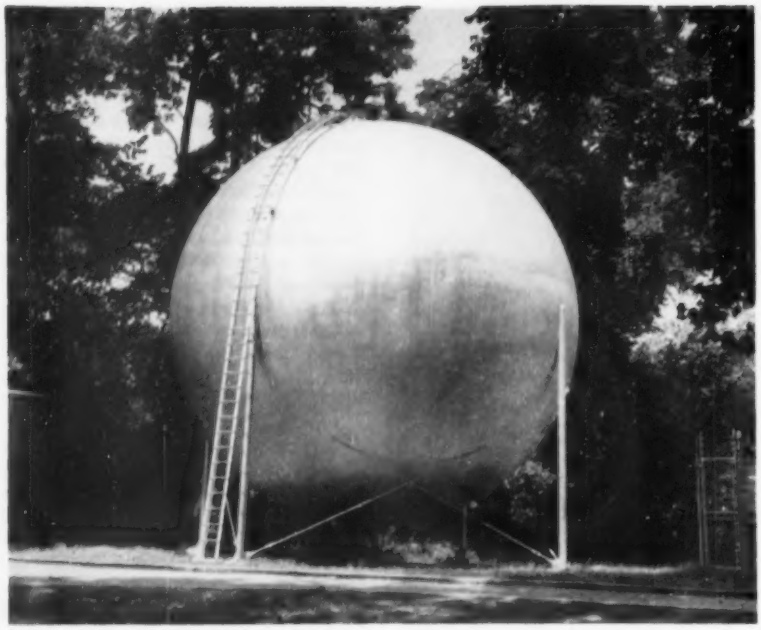
A plentiful supply of water under pressure with hose bibs near each plant unit is necessary for plant cleanliness. The danger of back-siphonage is familiar to most operators; however, all plant personnel must be alert as to what constitutes a dangerous cross-connection. These include using potable water: (a) as a pump priming source; (b) to flush sludge and sewage lines; (c) to lubricate pump bearings; (d) as water seals on centrifugal pump packings, and (e) on meter flushing devices. Others may consist of a physical connection between a system carrying non-potable water and a potable supply system; leaving potable water carrying hose immersed in sewage or in any open, unprotected tank of water; or installing a potable water line which terminates below the positive overflow rim of a tank, basin or sink. In order to protect a potable water supply, all installations where back-siphonage may occur should be supplied by water from a surge tank properly equipped with an air gap between the top of the tank and end of the potable water supply line.

Connections sometimes found in a sewage treatment plant laboratory are a potential hazard to the quality of a potable water supply. One of the most common dangers is the practice of connecting a length of hose to a sink faucet and allowing the hose to extend to a point near the bottom of the sink. There has been at least one example of an epidemic which was traced to a hose connection which was allowed to extend into water used to wash laboratory utensils.

Sewerage System

It is not intended to discuss sewer design; however, combined sewers and diversion points have a particular health significance. Although

● SAMPLING and testing of the sewage aid in operation and will provide data for future planning.

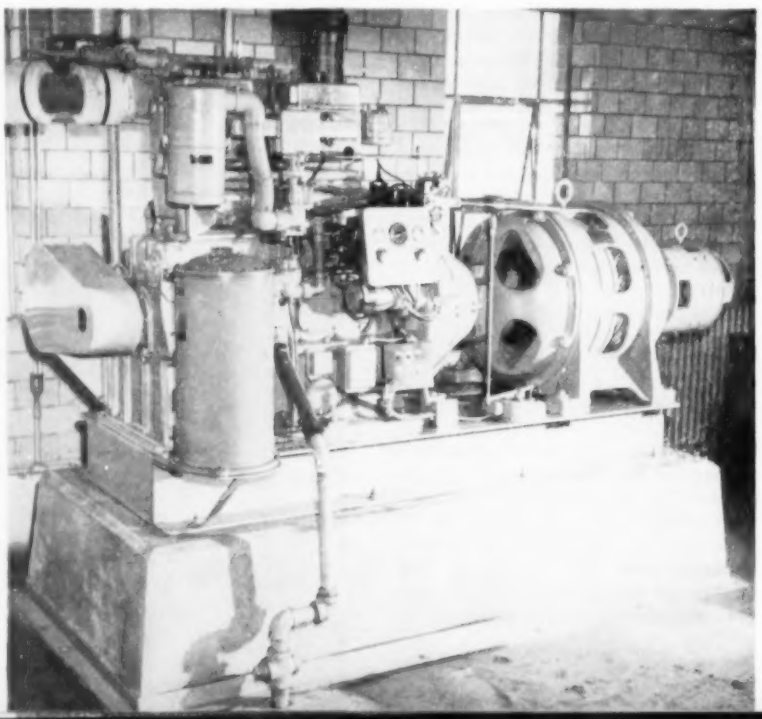


● **UTILIZATION of digester gas is coming into greater use. Equipment is available which permits all the gas to be used, supplementing supply with other fuel.**

combined sewers are generally frowned upon by sanitary engineers, many have been constructed in past years and some are still being installed today. Diversion points in such a sewer system are potential sources of stream pollution. The ratio of intercepted flow to average dry weather flow can be established only after a detailed study of stream use and the expected duration and frequency of minimum stream flows. In fact such a study may indicate conditions which will preclude the installation of overflow structures at certain locations. Sewer specifications often provide for each diversion weir to be set in the field at an elevation to intercept the average dry weather flow plus a factor of safety, in which case it is necessary that all sewer connections be made in order that the average flow can actually be determined prior to adjusting the point of overflow. It is desirable that diversion weirs be adjustable in order that they may be raised as additional sewer connections are made. Float controlled diversion points have been used extensively; however, frequent inspection of each float chamber should be made to insure that the float is not fouled by trash. It is especially important that all diversion points be inspected after each storm which causes overflow.

In many cases designing engineers do not make proper allowances for infiltration and peak flows. Detailed study of ground water conditions and close attention to sewer jointing material and workmanship will minimize infiltration. A knowledge of existing volume of flow based upon field measurements over a period of several days with hourly readings to establish the extent and duration of maximum and minimum flows is essential to good sewer design. Information regarding water usage and probable land use is valuable in estimating existing and future flow volumes. A safe and economical design can be accomplished only by detailed study of each area involved. Estimates based upon similar conditions in other areas should not be used as the sole basis of design.

Design standards or criteria tend to bring about uniformity; however, the use of these must be tempered with engineering skill and good judgment. The sanitary engineer who reviews and approves plans and specifications for sewage treatment plant construction must concern himself with the question of whether or not the completed plant will be a sound investment to the community and it is upon this basis that his recommendations are made. In order to insure that the completed plant will be capable of doing a satisfactory job, construction must be carried out according to plan with no changes except those approved by the engineers and the reviewing authority if required. Finally the sanitary engineer is concerned with plant operation which is dependent upon the capabilities and interest of the operator and the adequacy of the completed plant. The operator must keep in mind that whatever plant deficiencies there might be he must make the most of what he has and do his best to produce a satisfactory effluent under all conditions.



● **SEWAGE gas engine is direct-connected to 37½ KVA generator.**

Public Relations:

How to Dedicate a WATER TANK

ATLANTA has the right idea. When it had completed its new 2-million gallon elevated storage tank and was ready to put it into service, the city government made a day of it. Special invitations went out under the signature of the Mayor for an "old-fashioned Southern barbecue and dedication." Some 800 persons were fed, all seated under the tank. The barbecue pit was constructed on the site. Paul Weir, General Manager of the Atlanta Water Works, writes us as follows:

"The formal program included the husbands and wives of our official City Government, Presidents of Civic Clubs, PTA's, etc., in the area affected by the water supply improvement. He had Hollywood premiere flood lights sweeping the sky and reflecting on the tank, the August moon was beautiful and everyone seemed to enjoy themselves. We built an elevated speakers' platform for 76 people, and a band stand which accommodated 80 members of a popular Atlanta band.

"When Mayor Hartsfield pressed the button which simulated placing the tank in service, a two-minute recording was heard over the loud speaking system depicting opening of the valve and the roar of the water into the system. This was so real that one of the visitors came to me after the program and asked to see the big pumps that he heard on the recording.

"This entire program was developed, planned and produced by employees of the Atlanta Water Department. I am proud of each one of them. We feel that it is not enough to do a good job in one's work—it is also essential to tell the public about it. I haven't had time to eat any barbecue yet, but enjoyed the entire program. We were given radio and TV coverage, as well as the local press. We even received an editorial commending the Water Department and the City Government for conceiving the idea of dedicating a water tank to the service of its citizens. (We have a copy of one of the newspapers with comments). This was probably one of the largest outdoor meetings of its type ever held in the City of Atlanta. You are the first one to receive data on this Dedication as I wanted you to know about it first."

● **ATTRACTIVE 2-million gallon water tank dedicated by Atlanta.**

In the program issued for the event, information was given on the tank and its function—and something also on the Water Department needs and plans. The following data are abstracted from the program notes:

The East Atlanta elevated water tank marks an important milestone in the progressive development of Atlanta's water supply system under the Plan of Improvement Program. This tank cost $400,000 and required two years to design and erect. It is one of the twelve largest water tanks in the United States. It will fill at night without additional pumpage cost from the distribution system. It will materially improve water volume and pressure for 3,500 to 4,000 homes and businesses in the Kirkwood, East Atlanta and East Lake areas. It assures a relatively uniform water pressure of approximately 50 lbs. pressure around the clock; formerly pressure during the day varied from 15 to 30 lbs. and was 75 lbs. at night.

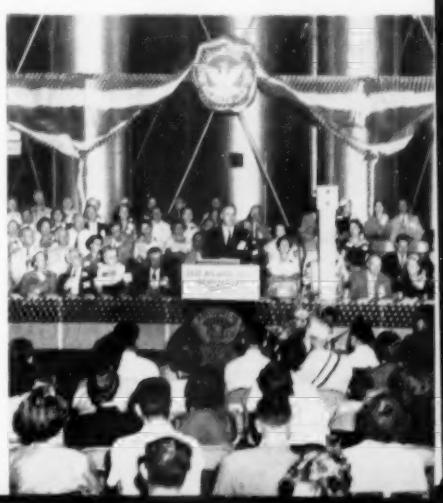
It was also necessary to extend, at a cost of $375,000, three miles of 24-in. water main to supply this tank. This project, approved two years ago, was financed by Water Revenue Certificates.

This tank, constructed by Chicago Bridge & Iron Co., is 102-ft. in diameter; 47-ft. high; and is erected on an 88-foot steel tower. The two million gallons of water entering and leaving this tank daily is equivalent to about 17,000 tons, or 600 tank cars.

During the past three years under the Plan of Improvement Program the Water Department has installed about 275 miles of water main serving some 60,000 citizens, at a cost of $1,000,000 per year; two miles of 48-in. steel feeder mains were built at a cost of $1,000,000. A new 50 mgd steam turbine pump was placed in service at Hemphill Station, the central pumping plant, at a cost of $470,000. Extensive needed improvements were also made at the river intake and pumping station, at a cost of $230,000. A number of smaller improvements have been made such as, distribution booster stations to improve water pressure in certain isolated areas. These water supply improvements total more than $6,000,000, Revenue Bonds for which were paid out of current Water Department operating funds.

A modern, growing, progressive city like Atlanta must do its best to keep up with all facets of needs of its citizens. The Atlanta Journal Editorial Page recently paid tribute to the City Government for the progressive manner in which the Plan of Improvement is being carried out.

● **PAUL WEIR, General Manager of Atlanta Water Works, speaks at the recent dedication ceremony.**



Paul Bunyan's HOMELAND Prepares for Winter

M. W. FISHER,

Engineer of Maintenance,

State Highway Commission of Wisconsin

RECENT winters in Wisconsin compare to the winter of the Blue Snow in Paul Bunyan's day about the same as present day bedbugs compare to the bedcats that sent Paul Bunyan's seven axemen screaming and clawing into the winter night. No doubt, snow removal, as we know it, would have been a simple problem for Paul and his shouting bruisers with Babe, the Mighty Blue Ox, but to the 71 county highway departments it presents a real task that is undertaken with skills and "know-how" gained by years of experience.

In their anticipation and preparation for snow removal and ice control, highway maintenance crews in Wisconsin join with crews in all the snowbelt states from Maine to California, in Ole Olson's homely song —"Yust the Same as You, I Enyo-oy it too—Merry Christmas Everyone!". Through years of experience, maintenance crews have learned the need for being prepared for that first big storm. One district maintenance engineer from the northern part of the state puts it this way "No matter how nice the weather has been all fall, you can bet your bottom dollar that along about deer hunting season or not later than Thanksgiving, we'll get snow".

The maintenance of the State Trunk System in Wisconsin is accomplished in a somewhat unique manner. The State Highway Commission arranges with the County Highway Committees in each of the counties to use county men and county equipment for practically all of the maintenance work on the state system of approximately 11,000 miles of rural state trunk highways. The work is supervised by the Maintenance Section of the State Highway Commission. Counties are paid for the use of their machines at hourly rates mutually agreed upon prior to the work. These rates are uniform throughout the state and are set forth in a "Machinery Agreement" entered into annually. County labor is paid for at rates prevailing in the county as determined by each individual county. Thus it can be seen that much of the preparation for winter maintenance work, especially the overhauling of equipment and mounting of plows, is spread out to 71 separate groups, each with its own shop and machines.

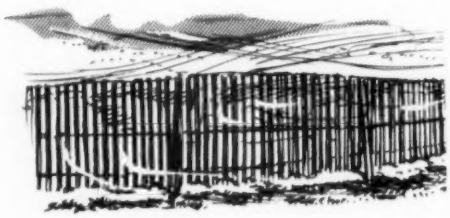
Ice Control

Preparations for the first assault of winter begin while vacationists are happily enjoying their favorite summer recreation among Wisconsin's thousands of lakes. The calendar and weather may indicate August but there's Winter in the hearts and minds of the maintenance staff. Estimates must be prepared and orders must be placed for the chlorides needed for ice control during the coming season. Arrangements must be made to ship these materials, purchasd through the State Bureau of Purchases, to each of the 71 counties and store them prior to mixing with abrasives used in sanding operations.

Except in the Milwaukee area, where cinders are available, sand is used for ice control. Very little ice removal is done with raw chemicals. Wisconsin is fortunate in having many deposits of sand or very sandy gravel from which good abrasive material can be produced. However, some areas in the so-called "driftless" part of the state may use "river-sand" or sand resulting from the decomposition of soft sand stone.

Each year from 150,000 to 175,000 cubic yards of abrasives are used. These are mixed with either sodium or calcium chloride to prevent freezing in the stockpile and to assist in embedding the individual abrasive particles in the ice. The stockpiles are located at strategic locations where loading equipment is available and as close as possible to their point of use.

Widespread use is made of front-end loaders attached to tractors to



load sand from stockpiles to patrol trucks. In many cases, temporary shelters have been provided for this loading equipment at isolated spots where prompt application of large amounts of abrasives require mechanical loaders. In addition seven sand bins up to 130-cubic yard capacity have been constructed. The use of bins and mechanical loaders has resulted in greatly improved service to road users at times when roads are icy. Prompt sanding of state roads is a *must*. Our daily living relies upon uninterrupted use of all highways.

The importance of agriculture in general, and dairy farming in particular, to the economy of Wisconsin, needs no further emphasis here, but the need for providing uninterrupted daily transportation via roads, both summer and winter, rivals that oft repeated slogan of the United States Postal service "The mail must go through". One hundred percent of the raw milk, over 15,000,000,000 pounds annually, is carried from farms to the processing plants or markets by trucks over Wisconsin's highway systems. Ninety-nine percent of the milk moving from Wisconsin to the Chicago market is transported via truck. Some 600 communities—cities, villages, and unincorporated places in Wisconsin—are entirely dependent upon highways for land transportation. School bus routes and mail

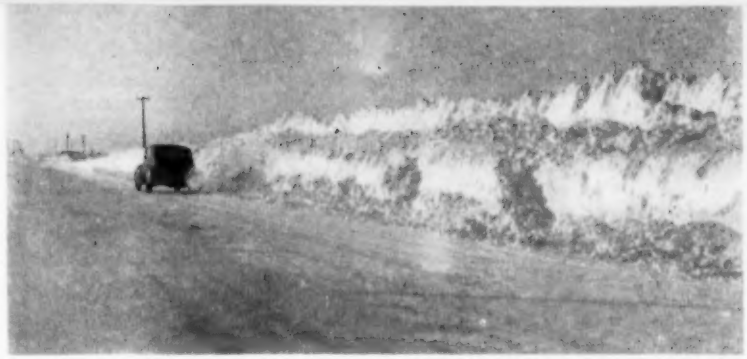
routes must be kept open. All of this adds up to the inevitable conclusion that there must be no relaxation for the maintenance men during the long winter months. To emphasize this point, a County Road Superintendent told this story that harks back to the lumberjack days: "The highway maintenance man is in about the same position as the teamster in a logging camp. The camp boss was telling one of his helpers when to awaken various men. He said, "Get the cooks up at 3 o'clock and the sawyers at 4 o'clock". The helper asked, "When are the teamsters to be awakened?" To which the boss replied, "When you see one of them sleeping—wake him up".

Because the work is divided among the 71 counties, it might appear that there would be a lack of correlation. Quite the opposite is true. There is more unity in operation and closer communication than one would reasonably expect. Nearly 50 percent of the county highway departments are equipped, at least partially, with two-way radio communication. Many counties have several snow removal units, along with the cars used by supervisory personnel, equipped with radio. This provides for close coordination and control of the work.

Communications and Road Information

The Main Office of the State Highway Commission at Madison and the nine District Offices have teletype installations, and daily (except Sundays and Holidays) throughout the winter maintenance season a conference type "hookup" of all Districts and the Main Office is established to report on driving conditions in all parts of the state. By this means, all District Offices have complete state-wide information on road conditions and can answer all inquiries on the subject. This conference "hook-up" is scheduled for 7:55 AM, and usually all Districts have completed their reports within fifteen minutes. Prior to 7:55 AM, each District Maintenance Engineer has obtained complete information on road conditions throughout his district.

Immediately upon completion of the conference call, the information is prepared for radio broadcast direct from the Commission offices over the facilities of the state radio broadcasting system consisting of ten separate stations. This broadcast of driving conditions on the State Trunk System is on the air promptly at 8:27 AM daily (except Sundays and Holidays) from about Thanksgiving time until April 1. It has received much favorable comment and is believed to furnish a valuable service.



● **SNOW as is snow! A drifted area has been cleared for automobile traffic.**

Drift Prevention

In addition to providing the supply of treated abrasives, 5,821,000 feet of snow fence must be erected before winter really starts. This fence prevents high drifts from forming on the roadway and makes it possible for the lighter and faster snow plows to operate effectively. As modern construction tends to flatten slopes and lift grade lines above normal ground lines, the need for snow fence diminishes.

The most common type of snow fence used in Wisconsin is the 4-foot lath and wire type. Crews like to drive the steel posts for this fence before the ground freezes. The fencing can be fastened almost any time, but if the posts are allowed to "freeze-in" before the fence is fastened to them, there is less likelihood of damage from high winds.

Equipment

It was mentioned previously that all of the equipment used for winter maintenance is owned by the various counties. The entire fleet owned and operated by the 71 counties consists of:

2,723 trucks under 5-ton
812 trucks 5-ton and over
863 motor graders
744 sanders
810 one-way plows
775 V-plows for trucks
370 V-plows for motorgraders
37 rotary plows
673 tractors
139 tractor plows

Cost of Winter Maintenance

The 1953-54 winter maintenance season was one of the least severe winters in over a decade; very little snow fell in the southern half of the state. As a result, the expenditures for snow removal, ice control and drift prevention amounted to only $2,216,358.00, or an average of $204.00 per mile of State Trunk Highway. The following is a distribution of these costs by activity:

Snow Removal	$ 52.00 per mile
Ice Control	112.00 per mile
Drift Prevention	40.00 per mile

The average annual expenditure for the previous five-year period was $3,028,989, or $281.00 per mile, distributed as follows:

Snow Removal	$134.00 per mile
Ice Control	110.00 per mile
Drift Prevention	37.00 per mile

● **AFTER plowing comes widening. A tractor-mounted plow is used for heavy work.**

New SANITARY LANDFILL for MARICOPA COUNTY

● BULLCLAM and IHC crawler tractor at work on the Maricopa County sanitary land fill. One operator does the work.

● COMPACTING the refuse—another view of the tractor and bullclam unit. An area of 40 acres is being filled in.

DEAN SMITH

FOR several years the open trash and garbage dump maintained by Maricopa County at S. 40th St. and the Salt River bed had been a problem to residents from southeast Phoenix, Ariz., all the way to Tempe, six miles to the east of the dump. The constantly smoldering fires in the dump caused air pollution and the dump itself was a breeding ground for flies, mosquitoes, and rodents. Then in 1952, when the Phoenix Sky Harbor Airport extended its runways to a point just west of the dump, the smoke created a more critical hazard to airplane landings and takeoffs. Moreover, more residential areas were building up in the vicinity of the dump and protests from citizens stepped up.

Maricopa County supervisors decided the answer was a sanitary landfill, and a 40-acre area adjoining the old dump was chosen as the site. Under the direction of sanitary engineer William Porter, who since has taken the post of director of sanitation for the City of Phoenix, the site was prepared and an International tractor and Drott bullclam was obtained. The new landfill operation was placed in operation in January, 1954, and the results have been highly successful.

"We had an ideal situation for a standard landfill on this site," Mr. Porter explains. "We had a natural bank near the river bed, a fine silt cover over most of the area, and an irrigation ditch nearby to provide water for maximum compaction.

"There was still another natural advantage to the site. We needed a dike of some sort between the landfill and the river bed, and we thus had a practical use for the old auto bodies, tree trunks, etc., that were hauled in. Although the river bed is dry about 15 years out of 16 we occasionally get a flood in the river and the dike was necessary."

The county also made arrangements with a sand and gravel company to dig a pit, as part of the company's operation, into which the auto bodies, tree trunks and other large refuse could be put after the dike had been built.

The landfill site was leased on a dollar a year basis from the owner of the property, who wanted to have the 40 acres filled and improved for future use as an agricultural operation. The site is expected to take care of garbage and trash disposal for the equivalent of a 50,000 population for a period of at least five years.

The county operates the landfill with one tractor operator working six days a week. A watchman works in conjunction with the operator, directing the dumping and making sure that large refuse is dumped in the desired location. Cost of the tractor and bullclam was $16,800, financed at the rate of $1,400 per month. Combined salaries of the tractor operator and watchman are $600 per month.

The watchman's job is made easier in that he is not required to screen out non-county dumpers. Excellent relationships between the county and surrounding municipalities have resulted in agreements whereby residents of Phoenix and other nearby towns may dump at the county landfill, and residents living outside a city limits may dump at the city dumps.

"We come out about even on this arrangement," explains Dale Treusdell, health educator in the Maricopa County Health Department, which supervises operation of the county landfill. "Even our county trucks sometimes dump in the

(*Please turn to page* 94)

Controlling WATER MILFOIL in a TEXAS RESERVOIR

ERNEST W. STEEL,
Professor of Sanitary Engineering

BEN B. EWING,
Professor of Civil Engineering
University of Texas

EXCESSIVE vegetation in and near reservoirs is undesirable for several reasons. Marginal plants may die or shed their leaves into the water and cause color and odors. Aquatic vegetation encourages siltation and if it dies may cause odors. Emergent aquatic and marginal vegetation may result in mosquito breeding. In reservoirs that are used for such recreational purposes as boating, swimming and fishing heavy growths of vegetation are productive of complaints from many users.

The water supply of Austin, Texas, is in part derived from Lake Austin, which is an impounding reservoir on the Colorado River. It is the lowest of a chain of reservoirs constructed and operated by the Lower Colorado River Authority for the purposes of power, flood control and water conservation. Lake Austin is much used for recreative purposes. There are many cottages, with boat docks, on its shores; swimming is permitted; and fishermen find it an excellent source of game fish and food fish.

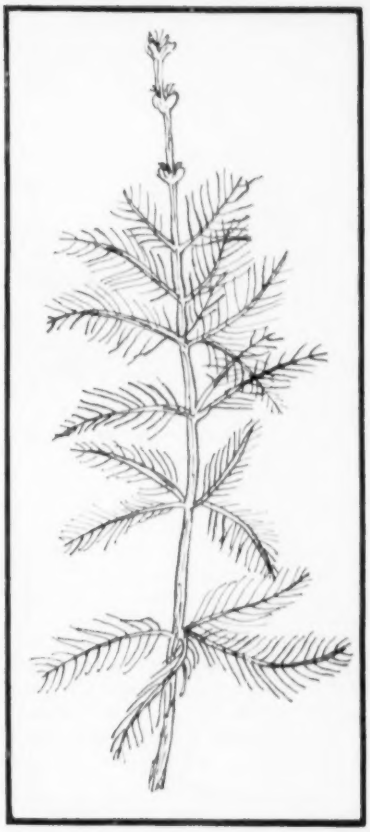
While there are some areas where cattails, water hyacinth and other types of emergent vegetation are common, the principal source of trouble in Lake Austin is a species of myriophyllum or water milfoil. This plant is almost wholly under water. The plant consists of a rooted stalk which will thrust a spike with a blossom, and finally a seed pod, above the water surface. Propagation is by means of sprouts from the roots, from the seeds and by the rooting of stem fragments. It will grow in water to a maximum depth of about 14 feet.

The milfoil grows in about 600 acres of the 3000 acres of total area of Lake Austin. Its presence in most of the shallow areas has been productive of many complaints. Boat owners complain of fouled propellers. Lake-front land owners complain that they cannot fish from their docks or swim on their beaches. Fishermen are divided in opinion. Some claim the weeds are valuable in maintaining the fish population; others, probably influenced by snagging of hooks, say the weed should be controlled. Aquatic biologists temporise. They speak of biological balance, that is, the relationship between plant life as a source of food for animal life, large and small, including some fish, and these in turn are food for other fish. There is also the matter of the weeds protecting small fish from the larger predaceous fish. From the medley of varying opinions, however, it appeared that Lake Austin would be considered a better place for recreation by most people if it had fewer weeds, at least in certain areas.

Experimental Work

The city of Austin and Lower Colorado River Authority made some funds available to the writers to carry on experiments to supplement some work which had already been done by the city. The city work included underwater mowing and use of an arsenical herbicide. The latter was used only in a restricted area where there was no current and tests were made at the same time of the water out in the main portion of the lake. The arsenic did not present a hazard but, on the other hand, it was not successful.

Lake Austin, as one of a chain of lakes, can be varied as to water level. For some years it had been customary to lower the water level for some six weeks in January and February as a means of checking the weed growth. This it did but with only minor benefit. Roots were not killed and before the end of summer heavy growths would reappear. The possibility of lowering the water level allowed consideration of use of soil sterilants as a measure of control, in addition to using herbicides in the water.



● **SKETCH by Prof. Steel of typical water milfoil or *myriophyllum sp.***

Aquarium tests were first made using 2, 4-D ester in which the weed was killed at a dose of 1 ppm. Fish were not affected at doses of 2 ppm. When tried in a restricted area of the lake, however, a much greater dose was required, even though there was no apparent current. Spraying the water surface with sufficient 2,4-D ester to provide a dosage of 5.3 pints per acre-foot was effective. This amounts to about 6 ppm. The herbicide when applied covered the emergent seed spikes but these are so small in comparison with the rest of the weed that killing must have been accomplished by the portion which fell directly into the water. No damage to fish was noted.

Copper sulfate alone and in combination with 2,4-D was tried but with no effect at reasonable doses. Nigrosine, a black dye, which has been recommended by some investigators, was tried in aquaria

● VIEW of Lake Austin showing shallow areas along the shores, favorite areas for milfoil growth.

but with such poor results that it was not tried on a larger scale.

Soil sterilants proved to be more efficient than chemicals applied to the water and 2,4-D ester was also useful when employed in much the same manner as a soil sterilant.

Since 2,4-D, as the ester or otherwise acts by stimulation of the plant, it is obvious that it should be applied to the leaves and stems, although killing is also possible by absorption through the roots. It was found that 1 pint of 2,4-D ester mixed with 6 gallons of water will care for 10,000 square feet. The solution should be applied uniformly to the weeds as soon as possible after the water is drawn down. The minimum permissible time before the water level may be raised again is unknown but it is desirable to wait until the weeds are dry and brown.

The true soil sterilants used were borax and CMU. These prevent root growth in the treated soil. Neither is poisonous in the amounts used, and in any case they are absorbed in the soil and leach out very slowly.

Borax was used at the rate of 10 to 15 lb. per sq. ft. A solution was made of 5 lb. of borax in 10 gal. of water, and this was sprayed uniformly over the area to be treated. Weeds and other debris should be cleared from the surface first. CMU, 80 per cent, was also effective. A solution of 1 lb. to 2 gal. of water was applied by sprayer to 160 sq. ft. of surface. Here also the surface should first be cleared of all debris.

Of the three methods used when the lake level was lowered the 2,4-D ester was the least expensive. The others are about equal in cost; with borax at less than 10 cents per lb. it will be cheaper than the CMU.

The soil sterilants, including 2,4-D ester, were applied to the lake areas in the early spring of 1953 and controlled weed growths through that summer. A check in early June of 1954 indicated good control by all the methods described up to that date. This indicates that weed control is obtainable for a period of two years as a minimum.

• • •

Tree Control in Detroit

The public, in Detroit, Mich., is eencouraged to help the city care for and plant trees. Permits are given free to prune and trim trees located on the street side of the sidewalk, provided these are minor jobs. Also the city arranges to plant trees to shade private homes. Trees are furnished at $15 to $30 each, depending on their size, and are guaranteed for five years. Booklets are issued telling how to plant trees properly.

Guy B. Walker, City Engineer of Wilkes-Barre, Honored for Fifty Years of Service

GUY B. WALKER, city engineer of Wilkes-Barre, Pa., will be honored by the Mayor and City Council of that city on Oct. 5. The testimonial dinner will celebrate the commencement of his 50th year with the City. Starting work on a temporary basis in Sept. 1905, he is still going strong. He has been City, Planning and Mining Engineer of Wilkes-Barre since 1939. Since he started, 52 miles of new street pavements have been constructed and 80 miles of sewers. Plans have been prepared for an intercepting sewer and a sewage treatment plant. All old bridges have been replaced with standard steel bridges which he designed. He designed and constructed the first swimming pool in that part of the state. He was among the first of Pennsylvania's registered professional engineers, being licensed in 1923. Mr. Walker belongs to ASCE and APWA; he is on the Traffic Committee of the city and is Chairman of the Northeastern Public Utilities Committee, cooperating with the State Highway Department on projects in seven counties.

These are but a few of his activities; the full value of his services to the community can scarcely be gauged by this summary of the highlights of his accomplishments during 50 years of service to the community. The high esteem in which he is held by his city is best indicated by the many honors being accorded him. PUBLIC WORKS MAGAZINE joins in best wishes to Mr. Walker for many more years of service and congratulations to the city of Wilkes-Barre in having such a fine public servant.

Mr. and Mrs. Walker have one daughter, who is a chemist; and Mr. Walker's principal hobby is fishing.

The YIELD *Sign*
WILL IT REDUCE THE STOP SIGN NUISANCE?

PAUL W. RICE,

Traffic Engineer, Evansville, Indiana

INTERSECTIONS have long presented a challenge to the police officer, the traffic engineer and safety officials. Various means and methods have been employed to assign right-of-way at an intersection, but few have been thoroughly successful in controlling the traffic and doing so economically. For this reason, and many others bordering on the ridiculous, the STOP sign has been used for nearly every purpose and at nearly every type of location. The Stop sign should serve two basic purposes, (1) reduction of accident hazards, (2) facilitation of traffic movement. With these two purposes in mind, we have tried to develop intersection control less restrictive than the Stop sign, yet effective enough to satisfy both purposes.

In most states the right-of-way rule prevails when two vehicles enter the intersection simultaneously. The driver on the right has the right of way over the one on the left. In a few states the driver, after stopping at a stop sign, then has right of way over the traffic and in some cases it is more of a hazard with the Stop sign than without.

Many signs have been used in an attempt to control traffic adequately at intersections. Critical speed signs were used and proven inadequate. "Dangerous intersection" signs have been used without satisfactory results. "Slow" signs are used, but are often unheeded and misinterpreted. The Stop sign has been the most universally accepted sign and with a reasonable amount of enforcement will reduce the traffic accident hazard. It will not, however, do much to facilitate traffic flow. All vehicles approaching the sign must stop, twenty-four hours per day and seven days per week. This fact, with others, led to the design and use of the less restrictive YIELD RIGHT-OF-WAY sign. This sign in each case of experimentation has the word "Yield" in large bold letters with the "right-of-way" in smaller letters underneath. Such signs have been used by many cities. Some of the experiences with actual use are cited below.

Dallas, Texas, has installed "Yield right-of-way" signs at more than 75 intersections. All are in yellow scotchlite or similar reflective material with black letters. The Stop sign is still standard for all major thoroughfares, but the Yield sign is used to protect secondary thoroughfares and at isolated intersections. Lloyd Braff, Traffic Engineer of Dallas, says: ". . . in the opinion of the motoring public, a Stop sign tends to create a sense of disobedience in a motorist when he repeatedly has to stop but does not see a vehicle on the side street. With a "Yield" sign however, he feels he is justified in making a "jack rabbit" stop, with the vehicle under control at a speed of about ten miles per hour. In some areas of the city, we have had reports from women drivers who have appreciated a "Yield" sign which had replaced a "Stop" sign, because during night hours when these women were driving alone, they were afraid to bring the car to a full stop because of the presence of loitering persons."

Mr. Braff also states that the observance of the Yield sign has been very good. He is experimenting with a double size sign with two blinking yellow lenses cut into the sign on an Expressway to cause the right lane to yield to incoming traffic.

Portland, Oregon, has made the following report on the Yield Right-of-Way signs: "Following publication of the favorable results obtained in other cities with the "Yield Right-of-Way" sign, it was decided to give this device a trial in Portland. The installation of these signs at the intersection of two two-way streets alters the basic right-of-way rule and there was some question whether this could be done without prior authorization from the State legislature. At the intersection of two one-way streets, however, one stream of traffic is always required to yield right-of-way since any approaching traffic would be from the right. In an alternating grid of one-way streets, this requirement to yield right-of-way occurs at every other intersection.

"The fourteen locations at which "Yield Right-of-Way" signs were placed for test purposes lay within the one-way grid immediately adjacent to the business district but outside the signal system. The streets carry average volumes of 4,000 vehicles per day varying from 1,000 to 7,000. During the introductory period one of the local radio stations gave valuable assistance by using the slogan "Yield Right-of-Way" during all station identification breaks.

● **YIELD sign has been helpful in reducing intersection accidents in many locations in several cities.**

"The accident record at nine intersections showed a reduction, at three intersections no change and at two an increase—one accident in one case and two in the other. Although the pattern was not perfect, in general the accident reduction varied inversely with the volume. The two intersections on the street carrying 7,000 vehicles per day showed no decrease in accidents while the two intersections on the street carrying approximately 1,000 vehicles per day showed a decrease from eight accidents to one, following installation of the signs. On the basis of this limited experience we feel justified in expanding the use of the "Yield Right-of-Way" sign at minor intersections of one-way streets."

Oklahoma City, Okla., has Yield signs located at sixty different intersections. Twenty-eight of these intersections have had such signs at one or two legs for a year or longer. At these twenty-eight locations the accident experience was compiled from the police records to include a year prior to the installation and a year after installation. Total accidents prior to installation were twenty-three. Total accidents after installation were twenty-one. This shows a 9 percent decrease in accidents. The accidents prior to and after installation were screened to eliminate all but those accidents which might have been prevented by the installation of the Yield signs, and those accidents which were a violation of a Yield sign. Accidents prior to installation which might have been prevented were twenty-two and those after installation which were in violation of a Yield sign were seventeen. This is a decrease of 23 percent.

The signs used by this city are black on yellow and are not reflectorized. Of the accidents due to violations of the Yield signs, only three in seventeen occurred before 7:00 AM and after 7:00 PM. This shows 18 percent near or during the hours of darkness which could be improved by reflectorizing.

Harry F. Burns, City Traffic Engineer, Winnipeg, Manitoba, has reported on Yield Signs as follows: Seven "Yield Right-of Way" signs were erected in January, 1953; five of these were located at the junction of separate right-turn lanes with intersecting streets. The remaining traffic movements at these three intersections are controlled by traffic signal lights. Three of the five right-turn cut-offs carry a heavy vehicular movement and the other two handle minor turn movements. In all cases the sight distance is excellent with no obstructions, and Stop signs were considered not warranted. However, some measure of control was deemed necessary as the established right-of-way rule at an uncontrolled intersection was felt to be inappropriate as the driver entering the through street would be on the right and theoretically would have the right of way. The majority of drivers did not exercise this right and no accident trouble was experienced from this cause but occa-

sional complaints were heard, and inquiries from the Provincial and City Legal Departments prompted us to initiate the use of the Yield-Right-of-Way sign.

The other two signs were erected at acute-angled T intersections where several requests for Stop signs had been received, but because of the physical and traffic flow characteristics we were reluctant to install such a regulation. The Yield sign again appeared to be the logical type of control and these locations were therefore included in our initial venture into the use of Yield signs. No definite results can be given at this time, but it appears that the principle appeals to the motorist.

In Tulsa, Okla., five typical locations were selected where the Yield signs had been installed for a detailed study of driver reaction. These were selected in an attempt to have five different and unrelated types of traffic. All met the conditions for this type of control, and responded well to the Yield sign treatment. They were typical of all of the locations in Tulsa.

Each intersection was observed as to the driver reaction to the Yield sign, when approaching, observing and driving past the sign. Vehicles were checked as to their approach speed, their reaction to the sign and their continued activity across the intersection.

All vehicles were classified, by the observer, in one of the five categories as follows: (1) entering fast—over 10 MPH, (2) entering slow—4 to 10 MPH, (3) practically stopped—0 to 3 MPH, (4) stopped by traffic, and (5) voluntary stop.

The results of the study in which 2,235 vehicles were observed, indicate only 12.6 percent of the entire group were considered in serious violation by entering the intersection and passing the sign at a speed greater than 10 miles per hour; 75.3 percent entered the intersection within the safe speed range but proceeded on through the intersection after observing the cross-street traffic. To this percentage can also be added the 3.3 percent who entered at a speed of 0 to 3 miles per hour. This totals 78.6 percent of the vehicles who were not required to stop and who did not choose to stop prior to entering the intersection.

It was also found that only 8.8 percent of all vehicles stopped before entering the intersection and driving past the Yield sign. It was further observed that of this number, 3.4 percent stopped voluntarily, while 5.4 percent were forced to stop by the cross traffic.

The first conclusion which might be made is that a total of 94.6 percent were not required to stop by cross-traffic at all. This is the margin of drivers aided when allowed to drive past a sign without stopping.

The majority of violations to the Yield sign rule were observed at one location. An analysis was then made of the remaining four locations studied. In this group there were 1,348 vehicles observed. Of this number, 83.1 percent approached the sign, observed the cross-traffic and proceeded into the intersection without stopping. Only 66 vehicles or 4.8 percent entered the intersection at an excessive speed. The remaining 12.1 percent either stopped by choice or were forced to stop.

Drivers, after seeing the Yield sign for the first time, were asked their opinion and interpretation of the sign. Without exception the interpretation was clear, there was no question as to their responsibility, and with but few exceptions, drivers stated that they were not required to stop unless cross-traffic required them to do so.

The accident experience at the first 50 locations were exceptional. In all cases where the sign was in place for over 12 months, there was an improved accident picture.

This material was abstracted from a paper sent us by the author and which he presented before the National Safety Council.

● **MODERN** refuse collection unit serving sanitary district in Nassau County, N. Y. Good maintenance reduces operating cost.

THERE'S NO SUBSTITUTE *for* GOOD MAINTENANCE

Here's a maintenance program that has increased the life of waste collection equipment at least 50 per cent, cut replacement and servicing costs, and increased operating efficiency in addition to the longer life.

SYLVESTER SORRENTINO,

Superintendent of Sanitation, Sanitary District No. 2, Town of Hempstead, Nassau County, N. Y.

I'VE been asked many times recently why our waste collection equipment always looks "new" —even though most of it's from four to seven years old. The short answer is as simple as the reason: Good equipment and good maintenance.

Our sanitary district operates equipment according to two rules. Our first rule is that an investment in equipment best suited to a job returns the greatest operating economy per dollar invested, regardless of price. Our second rule is "life insurance" for the first: A maintenance program based on, "An ounce of prevention is worth a pound of cure." No equipment can be expected to operate economically without proper maintenance, for which there is no substitute. I may be a "bug" about maintenance, but our maintenance program has shown, year after year, that it pays off. The benefits we have derived speak for themselves.

Each of the 14 Gar Wood Load-Packers we own, operates as well—and looks as good—as the day it was new, including a Load-Packer more than seven years old that we estimate is good for 15 years of service. Our costs for repairs, outside maintenance, accessories and parts for these packers, as well as for two open trucks for special jobs, one pick-up truck and one supervisor car we operate, will not exceed $3,000 this year, based on our past experience.

This performance record is, I believe, exceptional, but so is our maintenance program compared with others I have observed. Before explaining our maintenance program, I'd like to emphasize why I consider maintenance so important.

We serve a population of approximately 50,000, as well as businesses, in an area covered by the villages of Baldwin, Roosevelt, South Hempstead and a small part of Uniondale. Every household and business is given three garbage and two rubbish collections every week during our six-day schedule. This means that, on the average, 13 of our Load-Packers (the 14th is a spare) are operating six days a week, 52 weeks a year, with each packer averaging 16 loads of garbage and rubbish a week.

The wear and tear on any equipment as a result of such constant service is bound to be determined by the care exercised in keeping the equipment in top operating shape. Maintenance can either back up or let down performance.

Our first policy of preventive maintenance is cleanliness. After

each day's collections, the crew of every collection unit is responsible for thoroughly washing the unit. Every Friday, which is a garbage collection day only and therefore a short work day, every unit not only is washed but the body and chassis are waxed by the crew.

We derive two benefits from this cleanliness. First, any corrosive effects of garbage and any abrasion due to sand and dirt are minimized. Undue wear is prevented on body and chassis and the original finish is preserved. Second, the "spit-and-polish" appearance of our equipment gives our men a pride in equipment and job. Pride alone tends to increase operating efficiency because it promotes extra care and responsibility.

● **REGULAR servicing and maintenance, plus weekly washing, keep collection units attractive in appearance and improve morale and spirit of workers.**

Our second policy of preventive maintenance is regular servicing. The first step in this policy is a daily report, filled out by the driver of each truck. He reports the mileage, the number of collections, the tonnage of waste handled and any servicing he feels may be required. Our two mechanics are responsible for checking these reports daily for service needs, which must be attended to as soon as possible. A check on servicing is maintained by our accountant, who records driver reports and mechanic reports on each unit.

The second service step is having the crew of each unit responsible for greasing it every 1,000 miles and changing the oil every 800 miles. Our mechanics remind the crew a day before each unit requires such servicing.

Our final service step is a complete mechanical check by our mechanics once a month for each Load-Packer. Our spare packer lets us rotate each unit for a day in the garage. The mechanics take care of any service requirements which might not have been handled before the monthly check and look for any service problems not noticeable by drivers or crews.

As a result of regular servicing and a constant check on performance, we never have had a breakdown of equipment due to negligence. Small service needs have been taken care of before they became big needs, and many dollars have been saved by eliminating unnecessary wear and tear.

In a nutshell, then, cleanliness and regular servicing are the reasons our waste collection equipment operates and looks like new.

The best part of our whole maintenance program is its simplicity. Since we use a three-man crew on our collection units, it doesn't take the men long to wash or wax or lubricate each unit after the day's collections are done. In fact, preventive maintenance has become routine with them, like brushing your teeth before going to bed, so that most of the maintenance is complete at the end of each day.

I'd bet against odds that each of our Load-Packers will give us at least 15 years of service—50 percent more than the accepted 10-year life expectency—because of the maintenance program we follow. I'd almost venture to bet they'll never "die"—but only fade away, because our "spit-and-polish" care is designed to get full value out of them.

Radio Improves Garbage Collection

Two-way radio equipped garbage trucks have permitted improved garbage collection service in Santa Cruz, Calif. This radio system, which is operated through the fire department radio system, but on a different frequency, has proved valuable in several ways. An unexpected increase or decrease in the volume of refuse can be reported immediately to headquarters and the necessary change in assignment made. The superintendent can be advised from headquarters of complaints or needed inspections. And complaints received at the office regarding missed collections can often be satisfied within a few minutes if the collection crew is still in the area. The cost of installation has been a very good investment.

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More Channelizing in Maine Improves Traffic Control

In recent years the use of channelized intersections has been incorporated into highway planning. At these intersections so-called traffic islands are set up which channelize the traffic in such a way that better vision is obtained by the drivers of the vehicles, thus lessening the opportunity for accidents at these intersections. The cost of channelizing intersections is not too great in most instances and additional consideration is being given to using channelized intersections by the Maine Highway Department.

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Sanitary Landfill

(*Continued from page* 88)

Phoenix dump when we're close by, and we allow the Phoenix trucks to do the same. It has saved much time and expense for both of us."

Dr. Lucy Sikorsky, director of the county health department, and her staff have been pleased with the county landfill as a means of eliminating health hazards. Fly and mosquito control is a difficult problem in early summer, and the old dump had contributed as a cause of dysentery and diarrhea in children of the Phoenix area. Since Arizona has the highest infant mortality rate in the nation, the county health department had long sought to eliminate that portion of the problem caused by the dump.

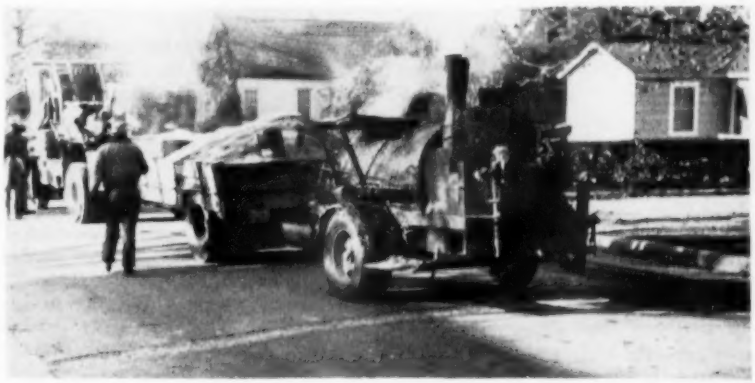
Plans now call for converting three more open county dumps to sanitary landfills in the near future.

PATCHING TRAINS Keep STREET MAINTENANCE ROLLING

GUY BROWNING ARTHUR

AUSTIN, Texas, has two pavement patching trains which are only now beginning to get attention, though they have kept 100 miles of temporary pavement in good condition for years. San Antonio and other cities have sent observers to see the trains in action. C. G. Levander, Director of Public Works, wishes they had three.

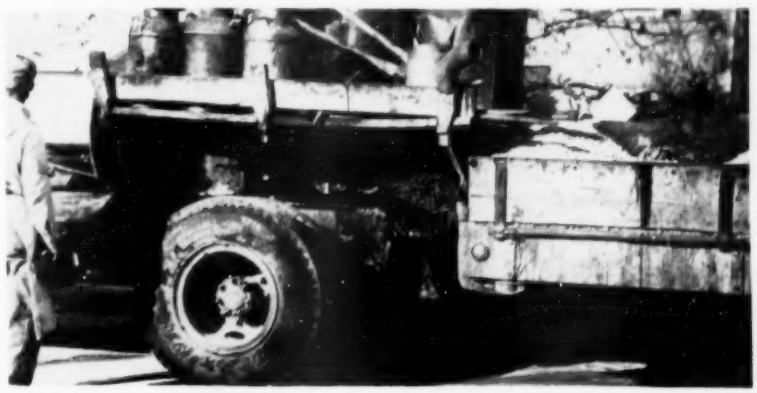
O. L. Ethridge, Superintendent of the Street & Bridge Division, tells how the trains grew up naturally for their purpose, developing the idea that if you send a crew out to do a job, you should send all the tools, supplies and equipment along. Each morning the crew loads the train with rock, oil, asphalt, pea gravel and accessory items for the day's work, and trundles out to where it left off the day before. The work goes on week in and week out with little direction. Each train has a crew of six men and a driver, thoroughly experienced and conscientious.



● NOT A steam engine pulling, but the asphalt pot at the rear of the train.

● TEAM-WORK speeds sprinkling, filling with rock and tamping the patch.

A train consists of a power unit hitched to a sway-bellied flat-bed trailer 28 feet long, and behind that an asphalt pot. The only piece of equipment lacking is the light roller, but this can do other jobs and still keep up with the patching train. One train is pulled by a 5-ton Mack, and the other by a 5-ton Caterpillar, but a 3-ton power unit could handle a train easily. The train is a completely home-made aggregation. Nothing in it is new. City workers have extended the trailer body over the fifth-wheel of the power unit to make a stage for 6 to 10 drums of asphalt. The normal length of the bed is divided into compartments to carry 2½ cu. yds. of ¾-in. rock, the same amount of ½-in. rock, and 3 yards of pea gravel. This aggregate is piled high in the bins in the morning, but late in the day the hinged side boards have to be let down so the last of the piles can be used.



● STAGE built over the fifth wheel of the power unit carries 6 to 10 drums of asphalt for use in the day's patching and maintenance operations.

Places have been made on the trailer for the hand tools used on the job, and each implement is kept in its place. Miscellaneous supplies and equipment are tucked in here and there, and the crew keeps the rig ship-shape.

Hitched on at the tail end is the asphalt pot. It is heated with kerosene from a tank at the rear, and the fuel is atomized with a big hand pump. The pot is the key to the operation. When the supply of asphalt in the pot gets low, the pot is uncoupled from the train, which then goes far enough down the street to get turned around. This maneuvering of the train is a trick in itself, and requires expert driving to get the train where it should be without arousing too much criticism from the public. Once turned around the train comes back to place its stage alongside the loading rack on the pot. The extra height of the stage makes it easier to turn a drum into the pot opening. The drum is hacked open at one end, and a big gash is made in the side that will be down when it is in the cradle.

For wide areas a spreader bar can be attached to the rear of the pot, and a thin coating 10 ft. wide can be sprayed over a surface, but the bar is not used very often. It has been suggested that the train would be improved by putting the asphalt pot between the power unit and the rock, but no one has seen a way to do it, and the advantage may not be as great in practice as it seems. Since there is no other good criticism of the train it is just as well to leave this one as a subject for by-stander conversation.

The trains are used only on temporary pavements, of which there are 100 miles in the city. They could be used on permanent pavements also, another 110 miles, if they ever got caught up on the temporary pavement work. These 210 miles of temporary and permanent pavement are distinguished from 390 miles of improved streets. As it is the two trains repair 3000 blocks of paving every year.

All utility cuts are filled back and paved by the city, billing the utilities for the work. Also, all other cuts are repaired by the trains. In addition they follow through on complaints about cracks, joints, bumps, roughness, leaks and other imperfections in the pavements.

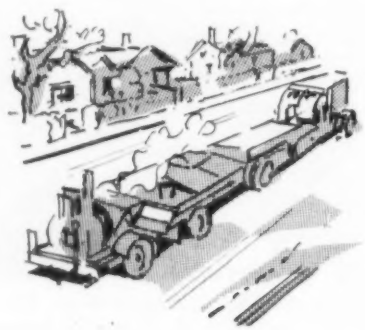
In operation the crew cleans out the cracks or trenches that are to be repaired. All the work is inverted penetration. The cut is treated with asphalt, and if it is a deep one the larger rock is used first. Then a thin coating of asphalt is applied, and the smaller rock is tamped in solidly. On top of this another thin coating is sprinkled and covered with pea gravel.

Just how the crew manages to build up a level surface which compacts only very slightly under the roller or traffic is a mystery. Just how much asphalt should be applied to get a perfect job without bleeding is another. When to use this or that rock or gravel is still another. But with an occasional extra shot of asphalt and a mixture of rock and gravel the job comes out perfect. The crew demonstrates remarkable skill.

One special tool is a 2-gallon sprinkling pot which the crew had made in Austin when they could not find a good one in the market. It is like a very heavy garden sprinkling pot, with a conical strainer which drops into the filling opening to catch any stray foreign matter. Also it has a sturdy cap on the spout which can be unlocked and removed if it gets clogged.

In the over-all work of the Street & Bridge Division these patching trains are only incidental. The Division's major work is taking care of draining, grading and other usual jobs. It has four district crews working out of one yard. There are also four construction crews for excavations and gravel jobs. All bridges are the responsibility of the Division, to some extent for construction but chiefly for maintenance. It erects and maintains the street name signs, and keeps up all city-owned structures, the storeroom and shops.

But nothing else in the Division will attract as much attention as the patching trains working back and forth across the city. In their way they are spectacular, both for their make-up and their work, and a lot of credit is due the people in the Division who have perfected them over the years.



Prevention of Frost Heaving by Use of Spent Sulphite

Heaving of surfaces due to freezing of moisture in the clay and silt soils which are widespread in Canada is of the order of ½ inch per foot of frost penetration but seldom results in "frost boils." Damage frequently results, however, from migration of water to the frost line and the formation of layers or lenses of ice. In laboratory tests, the heaving of samples of silty soil treated with 3 to 5 percent by weight of lignosol (spent sulphite liquor) was less than 10 percent of that of untreated soil samples; tests also indicated that though leaching of lignosol is likely to occur it may be very slow under field conditions. Four field sites have been treated and observed for three winters. It is said that fairly satisfactory methods have been developed for injecting lignosol solution into the soil by a pressure grouting technique. Grouting was done at depths of 4 to 6 feet below the surface in holes spaced at 6 to 12-foot centers. This procedure is thought to reduce frost heave for at least 3 years, but in fine sand or coarse silt leaching may be more rapid. The relatively high viscosity of lignosol solutions is thought to be a major reason for the effectiveness of the treatment in reducing ice segregation.—From Highway Research Abstracts.

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WASHO Road Test

Full scale traffic over the flexible pavement test road in southeastern Idaho was suspended from December 11, 1953, to February 17, 1954, during which time the pavement was frozen. Test traffic since February 17th, has caused some failure in the thinner sections but, probably due to the drier than normal fall and winter, the rate of failure has been lower than that noted last summer after the spring rains.

Test traffic in May completes traffic operation during all seasons of the year except the winter months when no effect of load is noted. Results of the test will be released eventually by the Highway Research Board.

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Were They All in Septuplicate?

Akron police officers in charge of the auction sale of towed-in automobiles, reported that 615 pieces of correspondence had been necessary in clearing the title to a tractor trailer abandoned on a city street.

● USING a hand-cranked portable spreader, highway safety grain is being applied to a wet highway for testing.

● SPECIAL mobile unit of Firestone measures skid resistance and traction of road surface by wheel at rear.

SOLVING THE "Slippery When Wet" ROAD PROBLEM

THE "slippery-when-wet" road is an important factor in many automobile accidents. To solve this problem, abrasive engineers of The Carborundum Company have developed a "highway safety grain" which, when applied to the highway surface greatly enhances skid resistance, thus promising to be an important means of reducing highway accidents. Tests indicate that stopping distance of cars traveling 30 miles per hour on wet asphalt highways can be reduced 1/3 by the application of this material.

In the "slippery-when-wet" road, the coefficient of friction between the bonding agent of the road surface and the tire is too low to prevent sliding and skidding when the surface is wet. Should the stone and slag in the road bed be completely covered by bitumen, the edges of the stone or slag do not come in contact with the tire and therefore, offer no resistance to prevent sliding and skidding.

Highway engineers refer to a condition known as a "fat" or "bleeding" surface generally caused by too much asphalt and too little stone. This "fat" condition is aggravated by heavy traffic and/or excessively high temperatures. According to observations made by C. E. Larson, Materials Engineer of the Bureau of Public Roads, a slippery-when-wet road surface can exist without a "fat" condition. His findings indicate that certain grades of limestone fines in either asphaltic or Portland cement surfaces may become highly polished by tire action, particularly where traffic is heavy and acceleration or deceleration is excessive. These highly polished areas are most conspicuous at intersections and sharp curves—and the condition may be accentuated where sand or cinders are used to correct ice hazards. The sand and cinders may act as a buffing compound and polish the road surface although at the time used they do assist in reducing the ice hazard.

To solve this slipperiness problem, Carborundum engineers employed a fused alumina abrasive material of over 2000 hardness on the Knoop scale compared with 850 hardness for quartz and flint, and 32 for limestone. This material does not wear smooth. It has a favorable cleavage angle which provides many small rough protruding points conducive to good tire traction. With the approval and assistance of Colonel Heber Ashley, New York State District 5 Highway Engineer, scientific tests were made on a three-lane strip on NY #20 west of Buffalo. The road is an asphaltic coated, Type "A," New York State hot mix which was applied in the summer of 1953 over an old hard surface road. At the time the site was selected the two outer lanes were very shiny.

The Firestone Tire and Rubber Company, which has developed scientific skid and slide testing equipment, conducted the tests. Firestone's equipment includes a panel truck, on the rear of which is mounted a fifth wheel assembly. The fifth wheel contact with the

(Please turn to page 106)

DESIGN DATA FOR OPEN AIR ARTIFICIAL ICE RINKS

O. B. WERT,
Air Conditioning & Refrigeration Division
Worthington Corp.

THE open-air artificial ice rink should be adjacent to a well populated area but in a central location to facilitate access by people from all parts of the town. The city engineer can help determine the best location and can weigh the advantage of using existing buildings such as heated field houses with toilet accommodations. Adequate engine-room space should be provided for refrigerating equipment. A possible location for a rink is the ball park. Many towns own fine ball parks where many facilities exist. Utilizing existing playgrounds may make it worth while to employ supervisory and maintenance personnel on a yearly rather than a seasonal basis.

Size: A rink 200 ft. x 90 ft. has a net effective skating area of about 17,000 sq. ft. after allowance has been made for rounded corners. This is sufficient space to accommodate from 750 to 1,000 skaters, since not all will be skating at one time. Except when designed for hockey, the rink should be made as square as the site will permit. The rink at Radio City was originally constructed in 1939 and was 40 ft. x 100 ft. It was later increased to its present size of 60 x 120, providing enough space for 250 skaters. Location, of course, will have much to do with size, and these figures are given only to provide background data.

Design: The design of the rink floor comes under three distinct categories:

Permanent Concrete Deck: The floor consists of a reinforced concrete slab in which is embedded a system of pipe coils through which the brine or refrigerant flows. The special concrete mix is poured without interruption, forming a monolithic-type structure free to float on its subfloor, making it possible for the floor to expand with change of temperature. This type of rink has the advantage of multiple uses such as ice skating and other ice sports in winter; dancing, roller skating, and similar sports in summer.

Take-up Rink: This type of floor consists of a system of plastic pipes, light in weight, through which the cold brine is circulated, causing ice to form around the pipes. The time required to lay the pipes and to take them out for storage in the spring is not excessive. The pipes are usually stored in the "header tunnels," eliminating need for storage buildings. The initial cost of the take-up rink is much less than that of any other type; and such a floor can be laid on any hard-surfaced court or on a ball field or other level ground.

Fixed-iron-pipe Grid: This type of floor has 1 to 1¼-in. wrought-iron or steel pipes, laid on creosoted-wood sleepers. The sleepers rest on a gravel or similar base for drainage. Sand is placed between pipes and flush with the top of the freezing pipes. The pipes are connected to headers, as in the other types. The advantage of this type of rink is that it may be located on the sand beach of a lake or outdoor swimming pool without interfering with its normal uses in summer. The pipes are covered with eight to twelve inches of sand in the summer season. When it is time for skating, the top sand is removed.

The great majority of ice-skating rinks have used an ammonia-calcium chloride brine-cooling system. Some have used reciprocating compressors and others centrifugal compressors to chill the brine. Calcium chloride is the preferred brine because of its lower freezing temperature, insuring against its freezing in the shell and tube cooler.

Reciprocating compressors are commonly used, except in large installations. Some form of unloading is essential in all cases. It is desirable to use two compressors, one to carry the normal load, the other to run only during excessive loading. An ammonia compressor will normally operate at a suction of about 20 psig and the discharge pressure will be rather low if the rink is operated during the winter months only. For outdoor rinks in winter operation and temperatures below 60° F, approximately one ton of refrigeration for every 150 sq. ft. of floor area should be supplied.

The brine cooler is generally of the shell and tube type, but a trunk-type evaporator may be used. The shell and tube brine cooler should be selected so that it can operate without too great a pressure drop when the total brine-pumping capacity is used. This will usually mean a cooler with four passes or less.

The brine tank does not have to be exceptionally large, and one equivalent to 8 x 6 x 6 ft. should be ample.

The brine pumps should be of all-iron construction, and it is advisable to use two pumps, to give flexibility of operation. Very rarely will the total dynamic head for these pumps exceed 50 to 60 feet of water.

The brine temperature for hockey should be about 14° F; for curling 16° F; and, for pleasure skating 18° F. In all cases, the returning-brine temperature should be 1½° to 2° above the supply temperature. The surface-ice temperature for pleasure skating should be about 30° F, and, for hockey and other sporting events, it should be about 5° colder.

The use of a brine system is recommended for these types of rinks to insure safety to summer patrons, as all the refrigerant will be located in the engine room. Most rinks use 1 or 1¼-in. pipes for the floor, as the small pipes distribute

the brine better, giving a more even temperature to the ice surface. A floor-piping-system layout using hairpin bends gives a constant average brine temperature, thus insuring a uniform freezing effect. Since the brine flows in opposite directions in each alternate pipe, it is not necessary to reverse the flow of brine at intervals.

A successful arrangement using hairpin bends is a one-pipe supply header and one-pipe return-brine header. The headers are laid in a trench on one side of the rink, with the floor piping valved and connected to the headers. In such a case, the headers must be liberally proportioned, to reduce the pressure drop to a minimum. Various other arrangements of two and three-pipe supply and return headers have been used successfully.

For the required temperature difference of 2° F between inlet and outlet, 2 gpm of brine should flow through each hairpin coil of 1¼-in. pipe, and the brine header should be on the long side of the rink. The pressure drop of the brine through the floor piping will generally not exceed 4 on 5 psig because of the small quantity of brine passed through each pipe and the short travel of the brine through only one hairpin coil.

In the preparation of the floor for the ice surface, the brine is circulated, at 5° F or lower, through the floor piping by the brine pumps to cool the whole mass of the floor to a temperature that will freeze water. The water is sprayed on so that the entire floor is covered with a thin sheet of ice. Consecutive applications of water are then made until the ice is of the desired thickness. A quarter of an inch of water may be sprayed when the surface is first started.

The thickness of the ice will vary for several reasons, and the ice must be planed and resprayed in order to bring it back to the desired thickness. This is usually done once a day, when the floor is resurfaced to remove snow and skate marks. Ice rinks of hard ice will produce a considerable amount of snow, and a greater number of sprayings will be required to bring the ice to the desired thickness. The spraying is usually limited to 1 32 in. when resurfacing.

The tools required to maintain the ice surface and keep it at the proper thickness, remove skate marks, and renew the old ice with freshly frozen ice are: Sufficient 1-in. hose and a spray nozzle or a water cart fitted with a spray; an ice planer; a tractor to pull the planer; a set of squeegees; and snow pushers.

A spray-water pump of about 25 gpm capacity at 280 ft. TDH will generally be required for the spraying. A bronze-fitted pump should be supplied.

Cost Data

The cost of construction will vary widely from city to city. The refrigerating system and floor-piping system using steel pipes for a 200 x 90-ft. rink will cost approximately $85,000 or $5 per square foot. In addition to this cost, the machine room, wiring, trenches, foundations, and concrete deck will cost approximately $55,000. The total cost of a 200 x 90-ft. concrete-deck rink is likely to be between $140,000 and $150,000.

The take-up system using a suitable level surface already existing would quite naturally cost considerably less, because the construction of concrete decks and special foundations would be eliminated.

The major item of operating cost is the electric power for driving the refrigerating compressors and the brine-circulating pumps. Water costs will be nominal, since evaporative refrigerant condensers should be used to conserve water. Power costs can be estimated at $2,500 to $3,000 for a not too mild winter with few days on which temperatures would exceed 60° F.

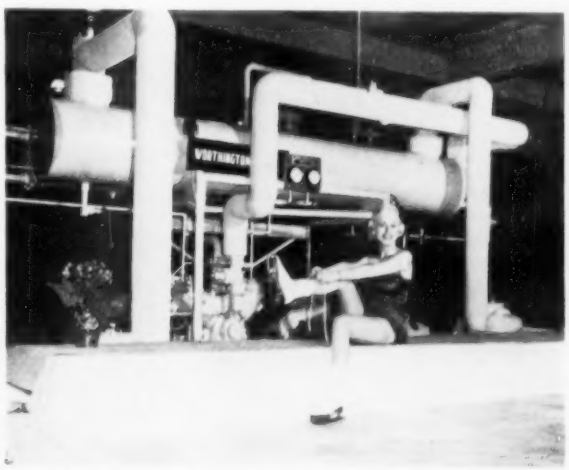
The operating cost will depend on local rules and labor rates. Additional help will be needed to care for the ice and see that it is kept in condition. A figure of $10,000 to $12,000 appears to be a fair estimate for these expenses. An additional outlay of $1,000 a season might be needed to defray costs of miscellaneous supplies.

Probable Income

Revenue to cover operating costs and amortization of the capital outlay will come from fees charged for skating and ice-hockey games. Fountain and refreshment stands should be put into operation to bring in additional revenue. A fair estimate of income would be: 400 children per day at $0.25 x 60 days, $6,000; and 250 adults per day at $0.60 x 120 days, $16,000. This will provide a total revenue of $22,000. This estimate allows for sixty free days for children.

These figures should permit the city engineer to make a preliminary study of the feasibility of an outdoor rink in his city.

● **POPULAR** winter sports area, Rockefeller Plaza's skating pond, kept frozen with Worthington refrigeration equipment.



● **ARTIFICIAL** ice rink frozen by portable refrigeration machine on display is ready for use by this comely skater.

FORMING A SANITARY DISTRICT

VOTERS prefer WATER to SEWAGE

V. A. VASEEN,

Partner, Ripple & Howe,

Consulting Engineers,

Denver, Colo.

NOT without some confusion and headaches, the voters of a section of Adams Co., Colo., adjacent to Denver, are going ahead with the installation of a water system, but have deferred construction of sewers and sewage treatment facilities, though it is hoped that these will be built within the next year.

As far back as 1948, packing plants discharging wastes to the Platte River were given notice by health authorities that treatment must eventually be provided, and an engineering report was prepared outlining methods of treatment. At about the same time it was proposed, by local interests, to include in an overall sewerage program, some 11 sq. miles of suburban area adjacent to the City and County of Denver, and a revised report was issued in 1951. Public meetings indicated a greater interest in a suitable water supply than in waste disposal. A sanitation district was formed, a board of directors elected, and Ripple & Howe were authorized to prepare a complete report covering both water and sewage disposal facilities.

The engineers advised that the sewerage system be constructed first, principally because there were no gas, water or sewer lines in the roads in this area and sewer construction could be carried on without danger of damage to other utilities. However, the bond issue for the sewer system was defeated. It was then decided to hold a combined election for both a water system and a sewage disposal system. At the election held late in December, 1952, a bond issue for $1,500,000 for a water system was approved, but the proposed bond issue for $1,500,000 for a sewer collection system and sewage treatment plant was defeated.

Plans and specifications were prepared immediately by the consulting engineers for the construction of the water system. This system consisted primarily of deep wells, underground storage reservoirs and booster pumps from the underground storage to the distribution system. It was hoped that wells to what is known as the Arapahoe Formation lying at about 750 feet beneath the surface would produce approximately 100 gallons per minute on constant pumping over a 24-hour period; and that similar wells to the Fox Hills Formation lying at about 1500 feet below the surface would also produce approximately 100 gallons per minute when pumped for 24-hour periods.

Four wells were drilled under contract to Hier & Price, local well drillers, in April and May of last year. Each well proved itself capable of producing an excess of 125 gallons per minute when pumped constantly for a period of 24 hours, and several of the wells indicated the possibility of pumping as high as 175 gallons per minute if this should become necessary; but the Consulting Geologist advised that the wells be pumped at a lesser rate, thus affording a better recovery on the water table, a more efficient use of the water, and reducing the sand pumping hazard.

The water from the Fox Hills formation, 1550 ft. deep, had a temperature averaging about 84°F, and the water from the Arapahoe formation 54°. The water has no turbidity and no odor, and is very palatable and pleasant to the taste. No treatment but chlorination is necessary. The Fox Hills water has alkalinity to methyl orange of 490 ppm, 259 ppm of sodium and only 6 ppm total hardness. Arapahoe water has corresponding values of 138, 83 and 10 ppm.

During the period when the wells were being drilled and tested, the Board of Directors received bids for materials and equipment to be used in the distribution and storage systems. The principal item of cost,

(*Please turn to page* 147)

● **NEAT and attractive appearance marks the Administration Building of the South Adams County Water and Sanitation District in Denver suburban area**

APWA News

AMERICAN PUBLIC WORKS ASSOCIATION
1313 EAST 60th STREET, CHICAGO 37, ILLINOIS

New Officers Elected for 1954-1955 Term

Coolidge, Public Works Director of Nashville, Tennessee, Will Serve as President for the Coming Year

Election returns announced at the 60th annual meeting of the American Public Works Association, recently held in Atlantic City, New Jersey, resulted in the election of Warren A. Coolidge, Director of Public Works of Nashville, Tennessee as President of the Association for the 1954-55 term. The new President succeeds Milton Offner, Secretary, Board of Public Works, Los Angeles, California who will remain on the Association's Board of Directors as immediate Past-President.

Mr. Coolidge has been active in the Association for many years and was one of the founders of the Tennessee Chapter which was organized last May. He has been a Vice-President of the Association for the past four years. Other members of this national organization who were elected to office are: Walter M. Swietlik, Commissioner of Public Works, Milwaukee, Wisconsin, Central Area Vice-President; Albert G. Wyler, Director of Streets, New Orleans, Louisiana, Southern Area Vice-President; and Robert L. Anderson, Supt. of Public Works, Winnetka, Illinois, Treasurer. In addition, the following members were elected to serve as Directors-at-large: W. D. Hurst, City Engineer, Winnipeg, Manitoba, Canada, Roy W. McLeese, City Engineer, Salt Lake City, Utah and Raymond A. Williams, Assistant City Manager, Miami, Florida.

Other members who continue to serve on the Association's Board of Directors are: Kenneth K. King, Director of Public Works, Phoenix, Arizona, Western Area Vice-President; Edward P. Decher, Secretary, Joint Sewer Commission, Newark, New Jersey, Eastern Area Vice-President; and Frederick W. Crane, Manager, Buffalo, (N.Y.) Sewer Authority, Director-at-large.

Warren A. Coolidge

President

Warren A. Coolidge

Vice-Presidents

Edward P. Decher W. M. Swietlik
Kenneth K. King Albert G. Wyler

Past President

Milton Offner

Directors

Frederick W. Crane Roy W. McLeese
Raymond A. Williams W. D. Hurst

Treasurer

Robert L. Anderson

Executive Director

Donald F. Herrick

Merrill Named Nichols Award Recipient

L. D. Merrill, Supt. of Streets and Sanitation for the City of Birmingham, Alabama, was named recipient of the 1954 Charles Walter Nichols Award. Announcement of this honor was made at the annual banquet of the Association at the close of the 1954 Public Works Congress & Equipment Show.

The $500.00 Award was presented to Mr. Merrill in recognition of his leadership in the development and modernization of the public cleansing operations of the City of Birmingham since assuming his present position in 1939.

The sound management policies established by Mr. Merrill during his past fifteen years of public service have won him the respect and admiration of the citizens as well as the officials under whom he has served.

The Award was presented to Mr. Merrill by Milton Rosen, Past President of the American Public Works Association, and Chairman of the 1954 Awards Committee.

Past Presidents Elected as Honorary Members

Three past presidents of the American Public Works Association, a national organization of over 2,000 public works officials, were honored today by being elected Honorary Members of that organization at its annual business meeting.

They are: Roy L. Phillips, City Engineer, Meadville, Pennsylvania, who served the Association as its President in 1941; Colonel Stuart M. Weaver, former Chief, Repairs and Utilities Division, Office of Chief Engineers, U. S. Army, Washington, D. C., who was President in 1945; and Milton Rosen, former Commissioner of Public Works of St. Paul, Minnesota, who was President of the organization in 1951.

New York-New Jersey Chapter Visits Giant Refuse Disposal Site

Facilities for water transportation of refuse, an important factor in the operations of New York City's Sanitation Department, were visited by members of the New York-New Jersey Metropolitan Chapter at their Fall meeting, held September 1st in New York City. The group assembled at one of the ten marine loading stations operated by the Department, where they were cordially welcomed by Hon. Andrew W. Mulrain, Commissioner of Sanitation. Following an introductory talk on marine operations by Paul Screvane, Director of Operations and Chapter President, a tour was made of the loading station, an almost completely enclosed structure where refuse is dumped directly into barges.

Members and guests then boarded a chartered sight-seeing yacht and enjoyed a delightful ride to the Fresh Kills Marine Unloading Station on Staten

Island, where 3,000 acres are being developed for future industrial, residential and park areas. Two unloading plants at this site transfer refuse from barges to wagon trains which haul it to the active face of the fill. Work in progress was viewed from a vantage point and members had an opportunity to inspect a display of operating equipment and repair facilities.

Following a dinner at the Downtown Athletic Club, a new slate of officers for the 1954-1955 term was presented. Andrew Eschenfelder, Borough Engineer of Glen Ridge, New Jersey, was elected as the new President to succeed Paul Screvane, Francis Klaess, Superintendent of Public Works, Rockville Centre, New York, was named Vice-President. William Foster, Engineering Editor, "American City Magazine", and John J. Baffa, Consulting Engineer, New York City, were re-elected Secretary and Treasurer, respectively. Others elected to serve on the Board of Directors were Harold Fredericks, Asst. Town Engineer, Irvington, New Jersey and Casimir Rogus, Director of Engineering, Department of Sanitation, New York City.

• • •

Getting Information on Garbage Cooking

Experiments in cooking garbage as feed for swine are being conducted in California and Iowa. At the University of California a wet-steam experiment has been going on for more than a year. In Los Angeles County, the county livestock inspection department is working with one of the large hog feeders on steam cooking of garbage. The National Institute of Health in cooperation with Iowa State College is conducting an experiment designed to (1) determine the time-temperature relationship necessary to destroy disease causing organisms in ground and unground garbage, (2) evaluate the effectiveness of the various heat treatments, (3) determine relative costs, and (4) develop reliable testing procedures to control heat treating operations. Future studies will seek to establish the value of heat-treated garbage as hog food.—Public Management.

• • •

New Method of Curing Concrete Test Cylinders

A new and inexpensive method for curing concrete test cylinders in the field under controlled humidity and temperature conditions has been developed. Test cylinders are placed in an "Acme" metal curing can which is lined with a thick layer of Du Pont cellulose sponge. This inner liner permits the absorption of two to four quarts of water with a 60 percent retention at seven days. The bottom of the can has a special gasket that insures a complete seal when the top is in place.

With this equipment, concrete test cylinders can be cured satisfactorily in a field laboratory during the hot summer. After the cylinders are prepared in accordance with ASTM procedure, the sponge liner in the curing can is saturated with water. Test cylinders are then placed in the bottom of the can, which is covered. The saturated condition of the cellulose sponge liner assures adequate humidity for proper curing.

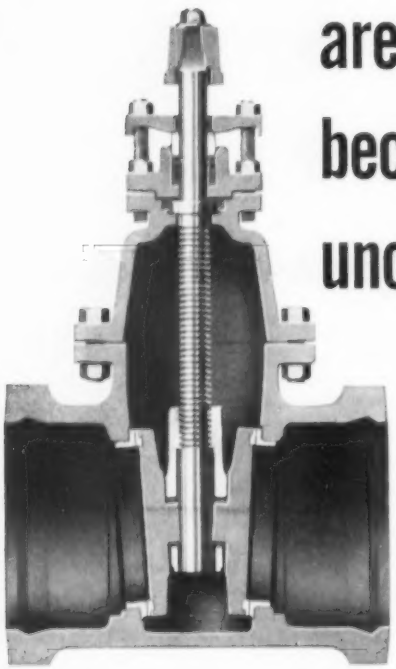
During winter field operations, the liner is used in a dry condition, reducing the retardation of proper curing due to low temperatures.

• • •

South Carolina Motor Fuel Oil Tax

The South Carolina fuel oil tax law requires all motor fuel oil users to pay a tax of seven cents a gallon on all fuel oil used in the state regardless of whether the fuel was purchased in that state or some other state.

R. D. Wood Gate Valves are reliable because they are uncomplicated



Available with mechanical joint connections.

There's a sort of reverse English to designing R. D. Wood Gate Valves. The point is to make them as simple as possible, to eliminate all the ingeniously complicated parts that look good in the blueprint but cause operating failures deep down in the lines. You'll appreciate their rugged simplicity when you put them to the test. R. D. Wood Gate Valves are built to function for generations of trouble-free flow control.

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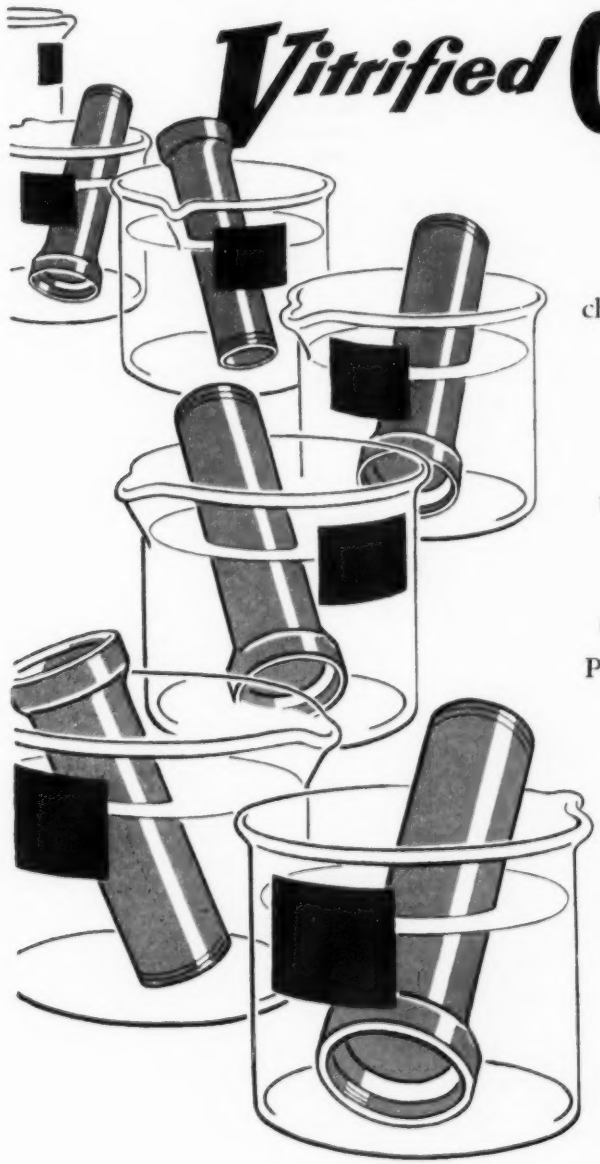

You've seen drain-cleaning compounds sizzle and foam as their caustic corrosive chemicals react together. Perhaps you've even seen some types of *non*-clay pipe that were eaten away by these compounds.

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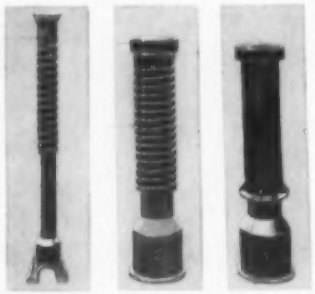

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Washington news

Presented in cooperation with the American Public Works Association and through the courtesy of the Washington Office of the American Municipal Association.

Survey of State-Local Public Works Plans

The Housing and Home Finance Agency, the Council of Economic Advisors and the Governments Division, Bureau of the Census, will combine forces this fall to undertake a nationwide survey of public works plans of state and local governments. In the closing hours of Congress, Section 702 of the Housing Act of 1954 (Public Law 560) was amended to provide that not more than 1 percent of the funds appropriated for advance planning loans (see July newsletter) could be used to survey the "status and extent of public works planning among the several States and their subdivisions."

The survey, which is an integral phase of the work being done by the coordinator of Public Works Planning of the Council of Economic Advisors, will be mainly concerned with the public works plans of the 1,262 U. S. municipalities with populations over 10,000. All states, and counties with populations exceeding 100,000 persons and a representative sampling of other counties, municipalities and special districts will be covered. The survey data are designed to afford an accurate state-by-state estimate of the plans of state and local governments throughout the nation. The data will afford an index of the status of plans preparation, the functional distribution of planned works, and a guide to the size and cost of contemplated construction projects.

Critical Metals

Allotments of steel, copper and aluminum for defense and AEC needs during the fourth quarter of 1954 are all scaled down over the third quarter's needs. The fourth quarter, 1954, allotments are the sixth determination that has been made under the Defense Materials System, which limits the allocations of steel, copper and aluminum to defense and atomic energy needs and activities.

Omnibus Public Works Bill

The House passed the omnibus rivers and harbors, beach erosion and flood control bill authorizing nearly $1 billion worth of projects, including multiple purpose dams. The measure, first omnibus public works authorization bill to come before the Congress since 1950, covers 85 river and harbor projects; 22 beach erosion projects and 39 authorizations for flood control and multiple purpose projects.

Construction Expenditures Hit New Peak

Expenditures for new construction rose seasonally in July to a new monthly peak of $3.5 billion, and reached a record total of $20.1 billion for the first 7 months of the year, according to estimates prepared jointly by the U. S. Departments of Labor and Commerce. Road construction and educational building construction were the third and fourth highest category of increased construction.

Total public outlays for public works construction for the first seven months of 1954 were about the same as for the first seven months of 1953—$6.3 billion. State and local governments, however, spent proportionately more of that amount this year, as compared with last year, than did the Federal government.

Priorities-Allocation Meeting

In early August a committee of three representing municipal government met with Director of Defense Mobilization, Arthur S. Flemming, in Washington. Purpose of the meeting was to discuss the matter of municipal priorities and allocations

CLAIBORNE OVERPASS, NEW ORLEANS, LA.
Designer: Master & Henderlite, New Orleans, La.
Contractor: Farnsworth & Chambers
Fabricator: Houston Iron & Steel Co., Houston, Texas
Owner: State of Louisiana, Department of Highways

THE HARVEY TAYLOR BRIDGE IN HARRISBURG, PA.
Designer: Modjeski & Masters,
Consulting Engineers, Harrisburg, Pa.
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Have you ever seen a highway railing rusting away? Today's highway engineers, city and state officials know the solution lies in making highway railings of a metal that needs no maintenance . . . Alcoa Aluminum. They know, too, that a quarter of a century of aluminum's successful use in these applications will support their recommendations.

This background started in Chicago 26 years ago. There, five bridges spanning the Chicago River were equipped with aluminum railings. Not a dime has been spent to maintain them. And in the intervening years, hundreds of aluminum highway railings have been installed—none of which will ever need painting to preserve them.

If you are in city or state government—in construction or design—you should have a copy of *Bridge Railings of Alcoa Aluminum.* Write ALUMINUM COMPANY OF AMERICA, 1975-K Alcoa Building, Pittsburgh 19, Penna.

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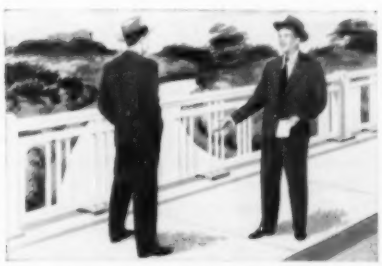

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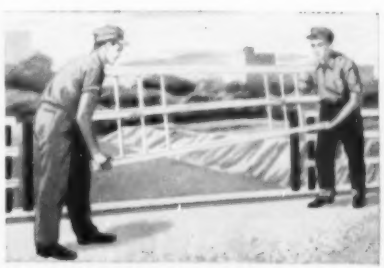

TO CONTRACTORS the lightness and ease of fabrication of aluminum railings mean savings in handling and erection. Standard tools do the job.

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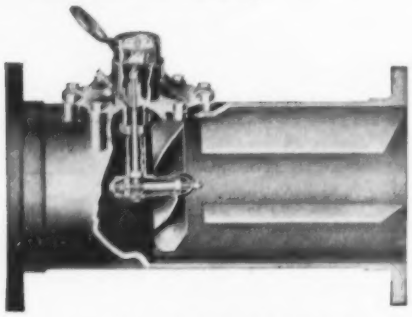

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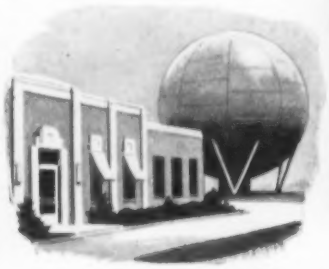

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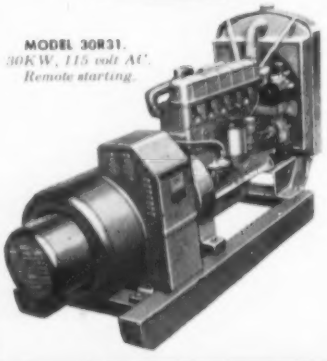

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in the event of a future national emergency. Representing the American Public Works Association were Sam Baxter, of Philadelphia, past APWA President; Gil Guetzkow, Director of Priorities and Allocations of the City of Milwaukee; and Randy Hamilton of the American Municipal Association.

On behalf of the municipalities, Dr. Flemming was requested to set up an ODM advisory committee on local government. The committee would act in a manner similar to those committees already set up and functioning in the various manufacturing and other fields. The purpose of the committee would be to make certain that municipalities are accorded their proper status and place in any future emergency system of properties and allocations.

Pointed out to Dr. Flemming was the experience of U. S. cities during the Korean emergency when they found the Federal government unequipped to handle the problem of procurement of materials for vital public services. There were at least 22 claimant agencies to and through which cities had to go for aid. There seemed to be no understanding of municipal purchasing procedures within the Federal bureaucracy.

Dr. Flemming indicated great interest in the proposal. The matter is now under active consideration by ODM staff. Public Works people can now look forward to the promulgation of a plan to overcome some of the difficulties experienced during the Korean conflict in obtaining vitally needed materials and supplies.

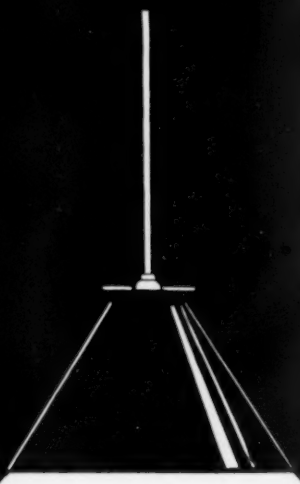
• • •

Slippery When Wet

(*Continued from page* 97)

road surface is controlled hydraulically by the technician within the truck. A mechanism measures and records the traction of the fifth wheel on the road surface. As a result of long experimentation by Firestone engineers, an empirical formula was developed which makes it possible to calculate the stopping distance of a car on the road surface being tested.

The Firestone tests on Highway #20 resulted in the following findings: Traveling at 30 miles per hour on the dry untreated highway, the distance required for stopping a car was 57 feet. When the untreated high-



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way was wet and moderately slick, the car stopping distance was 100.4 feet. A section of the highway was treated with highway safety grain and the tests were repeated. The stopping distance of a car traveling at 30 miles per hour on the dry treated highway was 57 feet, the same as the untreated dry surface. However, when the safety grain treated surface was wet the stopping distance was only 68.8 feet or 31.6 feet less than on the wet untreated highway. In other words, the stopping distance on the highway safety grain treated wet surface of asphaltic top highway was only approximately 2/3 the distance required to stop a car on the untreated wet asphalt highway.

Application Methods

The following directions for treating roads have been supplied to us. In practically all cases, the highway safety grain is spread at the rate of ¾ pound per sq. yd., using a rotary type spreader.

New Plant-Mix Roads: After spreading, roll once; apply the safety grain; and roll as specified.

New Cement Concrete: After the final leveling and floating operation, apply the safety grain; then drag with burlap.

Old Surfaces—Bleeding: Sweep clean of foreign material; if the surface is non-tacky, it may be softened by an application of Sovasol at the rate of 1 gal. per 100 sq. yds.; after this stands for a few minutes, apply the safety grain; and roll with a narrow roller, lengthwise and longitudinally.

Slick and Polished Surfaces: There are two methods here, applicable to both bituminous and concrete. In the first method, apply 0.05 to 0.10 gal. of AC medium penetration asphalt heated to about 300°; or RC-2 or RC-3 cold applications can be made. Then apply the safety grain; spread a light coating of stone screenings or fine sand as a blotter; and permit traffic immediately.

In the second method, apply a tack coat (RC-3 is suggested); heat the safety grain to about 350° in a dryer or pugmill; heat AC medium penetration binder to about 300°F and mix 5 percent by weight with the grain. Spread as above (¾ to 1 lb. per sq. yd.). If excess asphalt is present, apply stone screenings or fine sand and open to traffic.

Algal-Bacterial Symbiosis May Produce Food for All

STUDIES of the growth of green algae in sewage have been under way at the University of California Sanitary Engineering Research Laboratory for four years. In a recent issue of the SERL NEWS QUARTERLY the progress and implications of this investigation were summarized.

The results of the laboratory study showed that green algae such as *Chlorella, Scendesmus,* and *Euglena* may be made to play a vital part in photosynthetic oxygenation of sewage provided that environmental conditions are within certain limits. Furthermore, it became evident that a symbiotic process could be established in which oxygen produced by green algae would meet the oxygen demand for bacteria and other organisms oxidizing the waste organic matter. At the same time the algae, growing at the expense of carbon dioxide and ammonia, produced large amounts of algal cell material. It was calculated that under ordinary outdoor environmental conditions, one million gallons of domestic sewage could be

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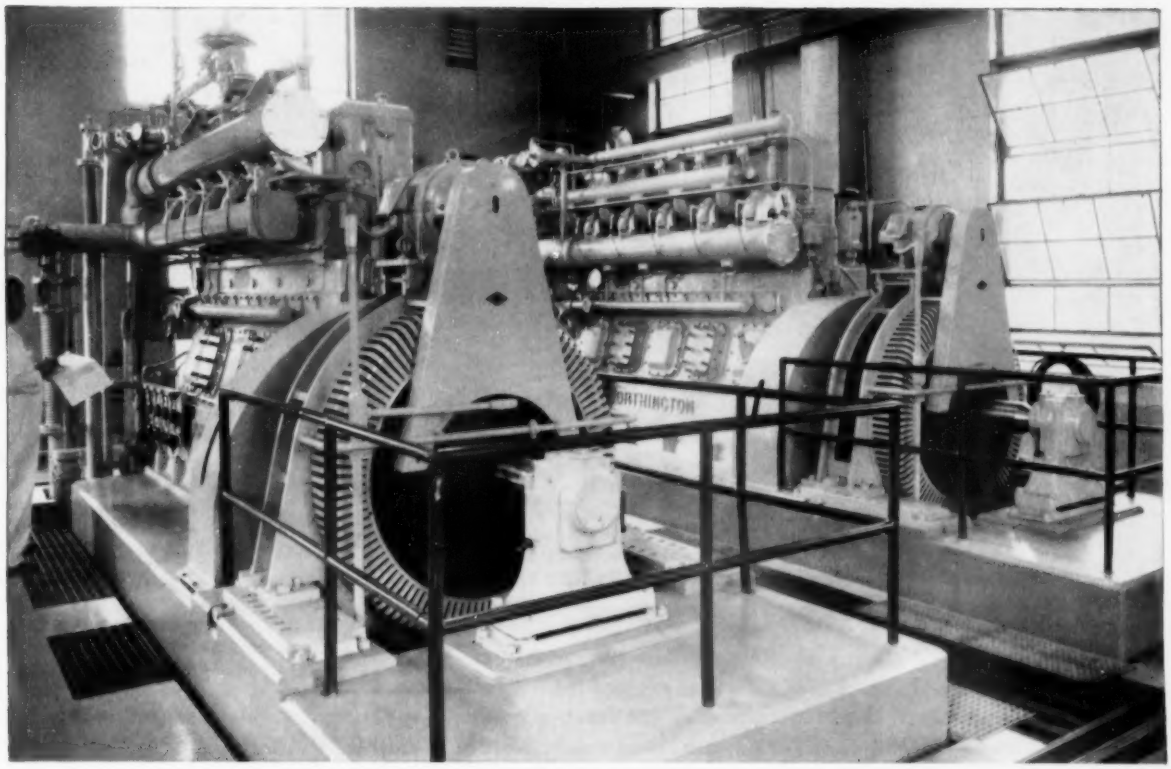
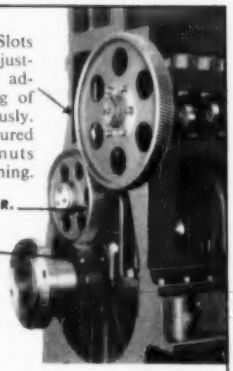


SERVING ALL OF TAMPA, the new sewage plant is powered by these two Worthington engines, with a total output of 435 kw.



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Worthington engines power Florida's largest sewage plant

Tampa's new sewage treatment plant, Florida's largest, was built in 1950 to keep pace with the city's fast-growing population — which has almost doubled since 1947.

All electrical power for this modern plant is supplied by two Worthington engines; one a spark-ignition gas engine, the other a dual-fuel Diesel. Each drives an Electric Machinery Company generator.

Both engines operate on sewage gas produced during the treatment of raw sewage. When the supply of sewage gas tapers off, however, the dual-fuel Diesel is switched over to Diesel oil.

Operating records of scores of sewage treatment plants show that you just can't beat Worthington engines as economical, dependable power producers. Get all the facts for yourself by writing to Worthington Corporation, Engine Division, Section E.4.7, Buffalo, N.Y. E.4.7

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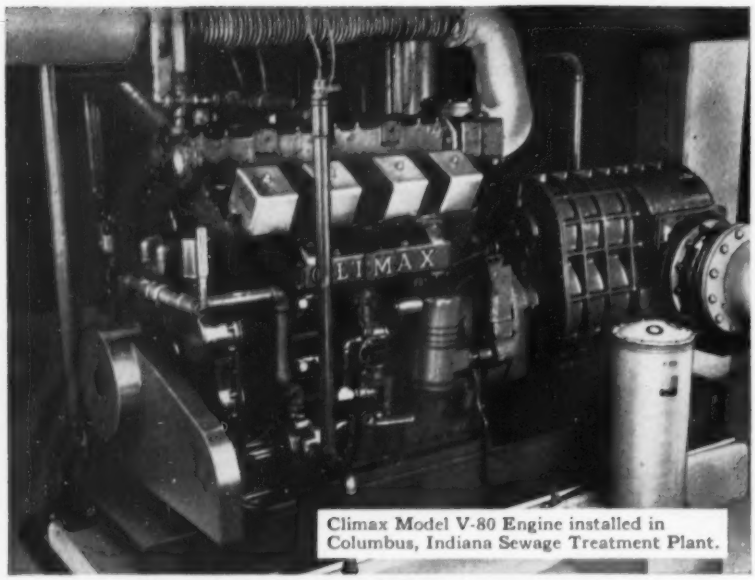
made to yield up to a ton of dry algal cell material.

Early in 1952 the process developed in the laboratory was tested in an outdoor pilot plant. Later, studies of depth, detention period, and recirculation were conducted in a redesigned, shallow pilot pond. These studies indicated that, in addition to treating domestic sewage to a degree equal to the best activated sludge plant, the process gave yields of dried algae of from 1000 to 2000 pounds per million gallons of sewage treated. The algae produced were unicellular chlorophyceae having a protein content ranging from 40 to 60 percent. On preliminary feeding experiments this material used as the sole protein source for young chicks gave a gain of 4½ percent per day, a value approaching that obtainable with the better plant proteins.

Depth and detention period studies showed that ponds could be operated either for maximum degree of photosynthetic oxygenation of sewage solids, or for maximum yield of algal cell material. Detention periods of only 2 to 3 days at pond depths of 6 to 12 inches appear to be feasible. The degree of sewage treatment accomplished by this operational procedure is a function of the final separation procedure. When complete separation of algal cell material is effected, the BOD removal ranges between 85 and 95 percent.

Investigations of economical methods for separating algae from the spent substrate are in the preliminary stages. It is hoped that studies of the growing of algae on all types of organic wastes can be undertaken for the purpose of establishing a basis for industrialized photosynthesis as a device converting solar energy into algal cell material for an animal food supplement and perhaps for fuel. The domestic sewage from the urban population of the U.S., together with the organic industrial wastes, is potentially capable of producing the entire protein demand of men and animals in the U.S. In addition, algae have an energy value of 10,0000 BTU per pound. In comparison with the digestion of activated sludge the energy yield of sewage through algae culture is four times as great. Commercial culturing of algae on organic wastes offers a hopeful solution to some of the food problems posed by an expanding population and to some of the energy problems resulting from the dwindling of the world's supply of fossil fuels.



Climax Model V-80 Engine installed in Columbus, Indiana Sewage Treatment Plant.

Columbus Discovered

. . . . it could save money by installing a dependable CLIMAX gas engine for driving a blower in its new Sewage Treatment Plant.

This 8 cylinder V-type engine has a continuous output of 143 H.P. when driving the 3000 CFM blower 765 RPM.

Until sufficient sewage gas is available, Superintendent G. F. Hendricks is cleverly blending natural gas with the sewage gas and reports satisfactory performance.

Plant designed by and built under supervision of J. M. Rotz Engineering Co., Indianapolis.

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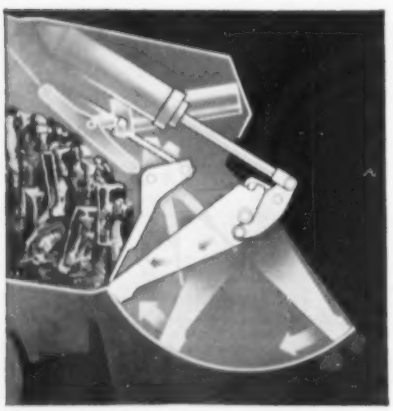
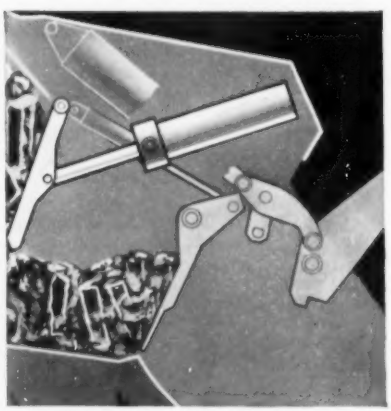
EXCLUSIVE "Dual Thrust" compaction... with the new Jam-Packing Panel



1ST THRUST — In the big new Load-Packers, the hopper load is hydraulically pushed into the body under 70,000 lbs. pressure. At end of compression stroke, ram-door swings back and opens automatically ready for reloading . . . retaining panel automatically locks to keep compression within body.

2ND THRUST — After the first thrust is completed, the Jam-Packing Panel pushes already-compacted material forward into the body, adds further compaction with another 35,000 lbs. pressure. This provides far greater compaction than possible on any other unit. Cycle is completely automatic, trouble-free.



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Three new Load-Packers* enable you to cut refuse collection costs up to one-third!

Now, in response to the requests of city after city, 3 "bigger brothers" have been added to the famous Gar Wood Load-Packer line. There's a new 20-yard size with standard compaction . . . plus a 20-yarder and a 24-yarder with new fully-automatic "Dual Thrust" compaction, which insures bigger refuse loads than ever before possible.

These giant new Load-Packers can mean a great deal to your community. *Two 24-yarders, for example, can do the work of three 16-yarders.* With two 24-yard Load-Packers, you make only 4 trips to the dump for every 6 you used to make. You save gas, oil, and tire wear. You save on manpower because two drivers do the work of three. You save service and maintenance because you have two units in place of three. You even *save up to $2,000 in original investment,* since you have to buy one less body and one less chassis. And, because of the new "Dual Thrust" compaction, you carry even more per load than you'd expect from any other 20 or 24-yard unit.

You are already well acquainted with the 10, 13, and 16-yard GarWood Load-Packers because more of these units have been sold in the past 16 years than all other makes of compaction-type refuse collectors combined.

Now let us show you exactly how these new *bigger capacity savings* can make your service budgets go still further. Ask your local GarWood distributor to help you analyze costs. He'll be glad to show you a Load-Packer in action, too, so you can judge its advantages for yourself. Call him today to arrange the details.

plus all the famous Load-Packer features

- **Loads everything** — Load-Packers take and compact everything . . . garbage, trash, wooden crates, broken furniture . . . even rugs, tires, cement blocks.
- **Low-level loading** — Big wide hopper provides room for entire crew to load at once. Low height, wide hopper eliminates spillage, keeps streets free of broken glass.
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- **Fast compacting** — Load cycle requires only 5 seconds of operator's time. All he does is hold lever to shut ram-door. Compaction is completely automatic at all times.
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Ask your friends who saw the new big capacity Load-Packers at the Public Works Congress at Atlantic City, Sept. 19-22, 1954

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now serving over 39,000,000 people in 2,500 communities.
Made in Wayne, Michigan, and Richmond, California,
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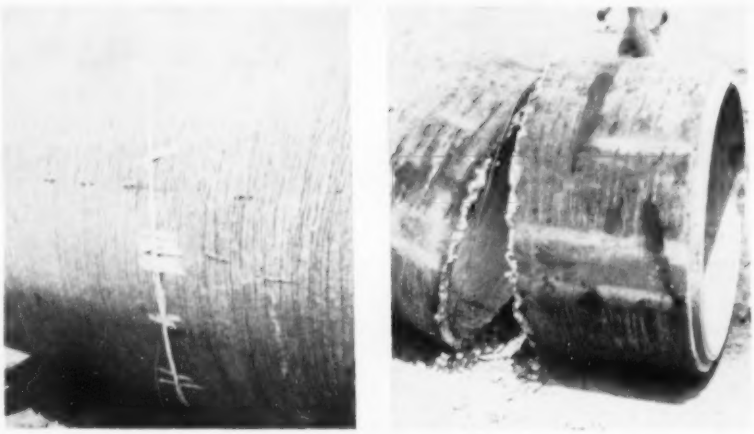
Cutting Reinforced Concrete Pipe With Explosives

A BETTER way of cutting reinforced concrete culvert pipe in the field with exposives is currently being subjected to experimentation by United Concrete Pipe Corporation at their Baldwin Park, California plant. Preliminary results indicate that it may be a faster and cheaper method. It is believed that J. A. Payton, a contracting firm operating out of Riverside, California, was the first successfully to cut concrete pipe with explosives in this manner, having adapted the procedure from their customary practice of cutting obstructing rocks with primercord.

United Concrete Pipe Corporation has conducted experiments with various sizes of reinforced concrete culvert pipe with varying wall thickness, with the assistance of Jack Cunningham of the Atlas Powder Company. Atlas 100-grain primercord was used and detonated with electric blasting caps. The primercord must be carefully wrapped around the pipe, especially for a miter cut. Varying numbers of turns of the primercord around the pipe and the position of the cord, as side by side or on top of other turns, were found to be important in producing the desired amount of fracture in each size of pipe. The blast travels through primercord at an approximate speed of 18,000 feet per second, producing an instantaneous effect. A distinct, clean crack can be obtained completely around the inside of the pipe to permit chipping away the concrete and cutting the reinforcing steel within a one-inch area, leaving clean cut edges.



● **LEFT: Primercord wrapped around 72-inch pipe. Right: 36-in. reinforced concrete pipe after blast. Longitudinal reinforcement is also cut by the blast.**

It is estimated that cutting concrete pipe in this manner will save 75 to 80 percent of the labor costs involved in the current method of using an airhammer, or a hammer and chisel, which requires a cut of four inches in width and leaves a jagged edge to be smoothed.

Cutting concrete pipe with ex-

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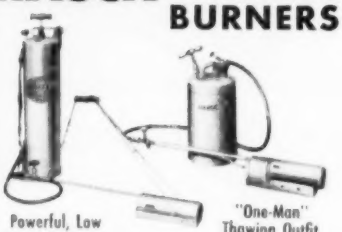
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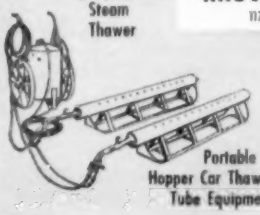
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plosives apparently is faster, cleaner, and possibly cheaper than usual methods but it does have the obvious drawbacks of noise, concussion, and dangerous characteristics inherent in any explosive. United Concrete Pipe Corporation is continuing its experiments which are expected to be concluded shortly.

Signs, Striping and Traffic Contr Signals in Arizona

AT the present time the job of striping the Arizona State Highway System is handled by a three-man crew in each maintenance district with one seven-man crew (with the larger painting machine) covering each district at regular intervals. Frequency of painting varies according to traffic volume, weather, and seal-coating. In some county areas, such as Maricopa and Pima, striping must be done 2 or 3 times a year due to the heavier traffic volumes.

About 6 gallons of paint and 36 pounds of beads are needed to place one mile of broken stripe. This compares with 16 gallons of paint and 96 pounds of beads per mile of solid stripe. Comparative costs are $25 for a mile of broken stripe and $75 for a mile of solid stripe. Approximately 43,000 gallons of paint and 300,000 pounds of beads were used during the 1953 fiscal year to reflectorize the centerline of Arizona highways.

With the exception of 60 miles on State Highway 95 between Yuma and Quartzsite, all paved roads are striped with reflectorized lines.

For the signs that mark Arizona highways, the state pays approximately $20,000 each year to the State Prison. Additional signs needed are manufactured in the sign shop at the Phoenix yard.

Five field men are kept busy placing new and taking down old signs throughout the state. Estimated damage from vandalism, especially shooting, is between $30,000 and $40,000 a year. A completed and installed sign is valued at approximately $2.00 per square foot of surface. Old signs are examined and those that have a salvage value are refinished and used again.

Constant experiments are made with various types of signs to determine what size, height, placement, color and letter size are best suited to the requirements of Arizona highways. Various materials such as steel, aluminum, plastic and wood have been tried, and different types

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Lakeside Spiraflo Tanks give you this and many other advantages.

Better than average results assuredly follow their use in sewerage treatment.

This picture of only one *hour's* accumulation of dead filter flies in the race of a Final Spiraflo Settling Tank following a high rate filter is just one proof of Lakeside efficiencies. Get the facts *now*.

Write for bulletin 122 for Spiraflo Clarifiers and bulletin 124 for Spiragesters

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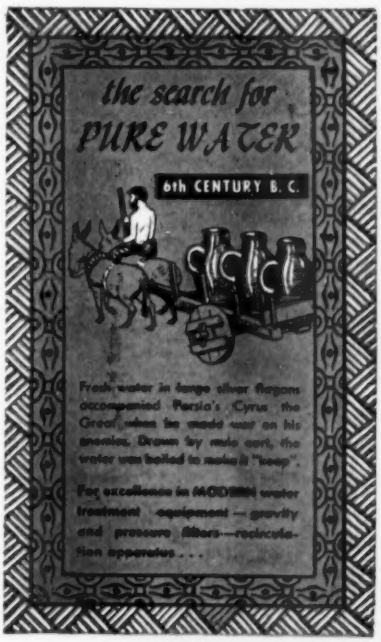

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of reflectorized materials are constantly being tested.

The state is now in the process of changing over to the new "Cardinal Color Route Signs." The color of the sign will indicate the direction of travel. The colors are as follows: Blue, going West; Brown, going East; Green, going South; and Orange, going North.

Traffic Control Signals

Traffic control signals at intersections on the State Highway System, are investments designed to aid in the orderly movement of traffic at locations where such special control is warranted. Safety is an important by-product of well regulated traffic control.

Traffic control signals are not a standard item, since each location or site presents numerous factors peculiar to the traffic and topographic conditions. Because of these factors, much study and research on traffic volumes, turning movements, approach speeds and photographic references are undertaken prior to completion of plans and specifications and the installation of signals.

Installation of signals is only part of the job. After signals are installed they require service, replacement and repairs. It has been the policy of the Department to require local governments in the zone where signals are located, to provide labor during installation, and service to the apparatus thereafter to the extent which service can be rendered by local personnel. In many cases where the control equipment is an electronic device, any work involving repairs or adjustments to the controller unit is reserved for the Highway Department. Since signals are widely distributed, immediate service may be impossible. In this event, the signal operation is switched to a flasher mechanism until necessary repairs can be made.

During the past several years that the Highway Department has participated in the purchase and installation of traffic signals, some extra replacement parts have been acquired. Wherever possible, equipment has been standardized to permit interchange of parts and to reduce the variety of stock which must be ready for emergencies.

Various types of signals used on the State Highway System are:

1. *Flasher type signal*—used principally at hazardous locations. These flash amber (proceed with caution) to highway traffic and red (stop before entering or crossing the intersection) to minor or side street traffic. Cost is about $500 for materials and $250 for installation.

2. *Fixed time signals*—turn green, yellow, and red in a constant pattern and are used to advantage in synchronized systems involving a series of intersections and where pedestrian volumes are heavy. Cost rials and $1,500 for installation.

3. *Traffic actuated signals*—are designed to cope with a wide range of traffic conditions and automatically favor the traffic loads as they develop, by use of traffic detectors located in the pavement. There are 2 types of traffic actuated signals: Semi-actuated (detectors on side street approaches only); and fully-actuated (detectors on all approaches).

Pedestrian actuated signals are used in conjunction with either of the types noted above. The pedestrian actuations do not extend green time but merely call for a walk indication of limited duration. Since these electronic control signals handle traffic so efficiently, they are used extensively on state highways at intersections where signals are au-

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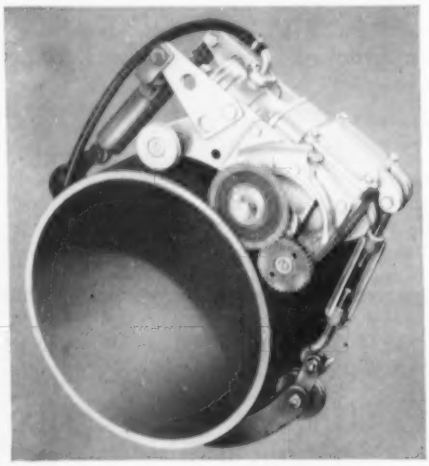

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PORTABLE AUTOMATIC: *Cuts 8"-60" Dia.*

• Weight: only 145 lbs. •Clearance: 12" max. around pipe. • Set up time: 5-10 min. by 1 or 2 unskilled men. • Pneumatic and electric machines operate under water. • Cuts 8" pipe in 5 min.—24" in 30 min.

Fein RECIPROCATING HAND SAW: CUTS ½"-6"

• Weight: 16 lbs. •Cuts profiles and angles up to 45°. • Will attach to pipe vise. • Cuts 2½" pipe in 1½ min.

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AMAZINGLY LOW COST. ONE YEAR GUARANTEE.

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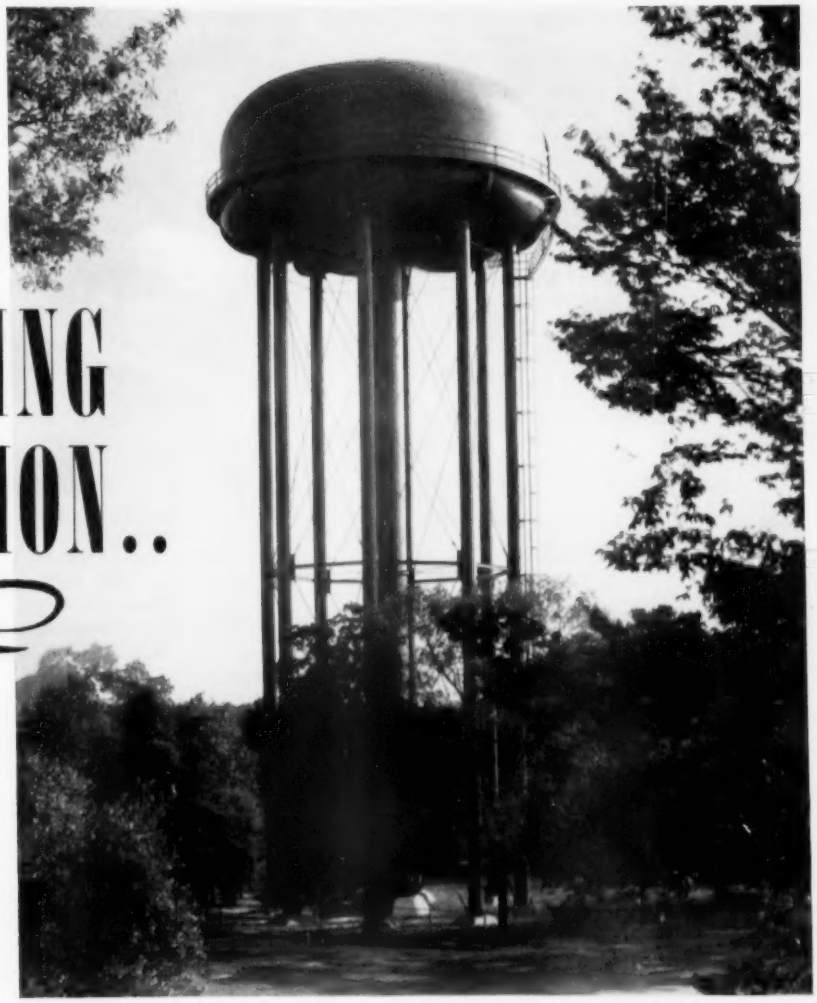

..HORTON Elevated Water Tanks

Shown above is a 500,000-gal. Horton® elevated tank recently installed for municipal water service at Aiken, S. C. This new radial-cone bottom tank is one of the latest additions to the growing ranks of Horton elevated tanks that are serving the small communities, villages and cities throughout the nation.

Modern, efficient Horton elevated tanks are built in standard capacities from 15,000 to 3,000,000 gals. Write our nearest office for estimates or quotations on a Horton elevated tank to improve your water system. Please state capacity desired, height to bottom and location. There is no obligation.

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Birmingham 1.....1532 North Fiftieth St.	New York 6.....3316-165 Broadway Bldg.
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Cleveland 15.....2221 Midland Bldg.	Salt Lake City 4....539 West 17th South St.
Detroit 26.....1536 Lafayette Bldg.	San Francisco 4.....1525-200 Bush St.
Havana.....402 Abreu Bldg.	Seattle 1.....1339 Henry Bldg.
Houston 2.....2142 C & I Life Bldg.	Tulsa 3.....1641 Hunt Bldg.

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thorized. Cost per intersection for materials vary from $4,000 for 2-phase traffic equipment to about $7,000 for 3 or 4-phase equipment. Installation costs are about $2,000 or $3,000 depending on the conditions and the amount of equipment required.

Traffic signals, when properly placed, add order and safety to the flow of traffic on the highways. The design and specifications and application of signal equipment is a science in itself and is handled as such by the Arizona Highway Department.

The data in this article are taken from a publication of the Arizona State Highway Department.

• • •

Procedures in Reconstructing a Texas Highway

From an article in Texas Highways, by C. N. Parsons, Assistant District Engineer, District 22

RECONSTRUCTION of a section of highway, 19.5 miles long, in Uvalde Co., Texas, involved a number of interesting problems. Estimated to cost $300,000, the proposed work included a revision to eliminate the trench effect of the existing section by placing base the full crown width of the subgrade; adding sufficient base material to obtain a 12-inch depth of compacted base with a finished crown width of 30 feet for the base; and then widening the surfacing to 22 feet. In addition to that, we were proposing to widen the existing structure at the Sabinal river, revise the existing grade line in several locations to improve vertical sight distance and reduce the curvature by a revision of the alignment in several instances.

We first had intended that the existing bridge on the Sabinal River should be widened but we later modified our plans, removed the old structure, and replaced it with two 60-inch concrete pipes, concrete roadway slab with 26 feet width, and concrete riprap both upstream and downstream on the slopes.

Construction procedures followed involved preparation of the subgrade to obtain additional width. This was accomplished by blading out the material forming the existing shoulders to a depth dependent upon the existing base, then shaping and compacting the subgrade with sheepsfoot and pneumatic rollers. Then the existing base material was scarified, spread in a uniform layer for the full width of the subgrade and recompacted. The additional base material, pit-run, was then added in two courses. The material was compacted in light lifts, using sheepsfoot, pneumatic and grid-type rollers. We tried using the grid roller for the first time in this District on this project, and found it most useful in road processing the material as well as for obtaining good compaction results. The second course of material was shaped, compacted, and finished to section and a smooth riding surface obtained preparatory to placing 60 pounds per square yard of cold-mix limestone rock asphalt pavement for a width of 22 feet.

• • •

Census Reports on "Special Districts"

According to the Bureau of the Census, there were 12,300 special districts in the United States in 1952, not including "authorities" for water supply or sewerage purposes. Most of these districts were very small; only two percent, or about 250, had revenues of as much as half a million dollars; and some 8,000 of the districts had incomes of less than $10,000 per year.

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1/2-yard hoe

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With long, deep reach and 8'-9" dump clearance, Koehring ½-yard 205 hoe delivers big output on basements, footings, water and gas mains, storm sewers and other below-grade digging. Powerful cable crowd, fast line and swing speeds maintain big-yardage production. Heavy-duty box-section boom and dipper arm resist side-sway. Close-coupled dipper pulls up tight to boom, avoids spillage. This 205 converts to ½-yard shovel, ½ to ¾-yard clamshell or dragline, 10-ton crane. Also available on truck mounting (15-ton lift capacity).

Get complete facts. Send for Koehring 205 bulletin.

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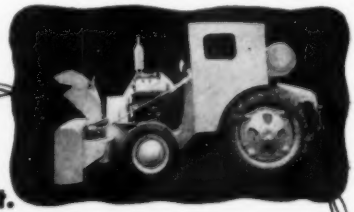

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2400 sq. ft.
of SNOW PER MINUTE

The Maxim Model 248 Snow Thrower is fast and powerful . . . 31 h.p. on the thrower alone, with a separate driving engine, 4 forward speeds plus reverse . . . compact enough to clear the average sidewalk (48" wide) without damaging turf. Machine turns on a 10' radius; can climb an 8" curb. Easy to drive and control. Readily converted for use with all-year-round attachments.

ALSO . . .
Maxim Models 628 and 728 have maximum speeds of 230 and 375 ft./min., capacities of 535 and 874 sq. ft./min., 7.5 h.p. engines. Thousands in use from coast to coast.

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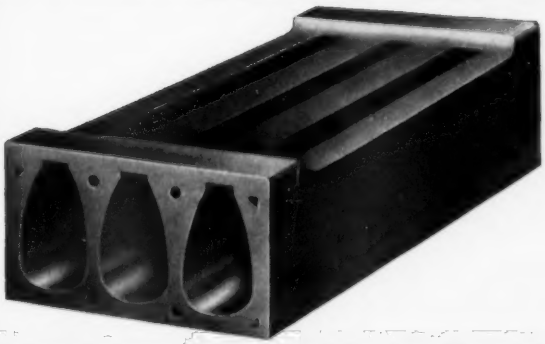
ACID RESISTANT ★ HIGH COMPRESSIVE STRENGTH ★ EASY TO LAY

Close-up view of filter bed showing filter media directly on top of Unifilter Block Underdrain Floor at Sewage Treatment Plant in Worcester, Mass.

NATCO
salt glazed
UNIFILTER
underdrain
BLOCKS



Whether it's strength, acid and corrosion resistance, durability, low absorption, rapid flow characteristics—NATCO UNIFILTER salt glazed underdrain blocks more than meet the requirements. They provide maximum drainage and ventilation capacity for either standard or high rate trickling filter sewage treatment plants. Moreover, they are easy to handle, easy to lay, and they are chemically inert and permanent in form.

These are more than claims—they are statements of fact based on records where NATCO UNIFILTER BLOCKS have been installed and are successfully performing . . . and that means in some of the largest sewage treatment plants in the world.

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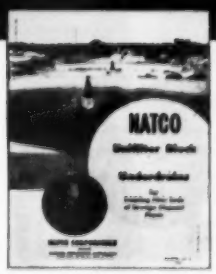

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PUBLIC WORKS DIGESTS

THE WATER WORKS DIGEST

Freezing Hydrant Branches

Widening a street at Dunn, N. C. necessitated moving hydrants further from the main by lengthening the branches. Two of these branches were not provided with valves, and to permit cutting the branch, it was frozen solid a few feet from the hydrant, the cut made and a gate valve attached to the end of the pipe. Freezing was accomplished by use of dry ice and gasoline. (See *Digests* for May). One branch was 6-in., the other one was 4 in. The 4-in. pipe was frozen in three hours, the 6-in. pipe in five hours. About 150 lb. of dry ice was required for the 4-in. pipe and 225 lb. for the 6-in.

"Hydrant Branches Frozen to Facilitate Extensions". By A. B. Uzzle, Jr., City Manager. *Water Works Engineering,* August.

Distribution Systems In Arctic Regions

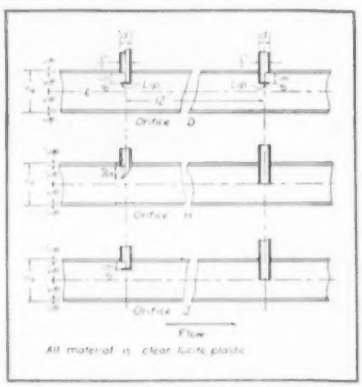
In Alaska and northern Canada, three systems are in use for distributing water supplies—the utilidor; dual main recirculating; and single main. In the last, continuous flow in the main and house service is maintained by wasting water through open house taps. Experiments show that a velocity of 0.17 foot per second in a service pipe will prevent freezing if the pipe is properly laid. A recent modification of the single-main system, to eliminate wasting water, is to use a dual house service pipe, both ends of which are attached to the main by special fixtures, one of which causes pressure in one leg of the service pipe, while the other causes suction in the other leg—similar to the operation of a pitot tube. The author describes tests made of several devices designed for attachment to the ends of the dual service pipe for producing flow through it of at least 0.17 ft. per sec. when the flow in the main was 2 ft. per sec. Fifteen different designs were tested, and two selected as the most efficient, one for use where the flow in the main is always in one direction; the other operating when the flow is in either direction. (Flow in the main is continuous from the pump, through the distribution system, and back to the pump, where it and the water added to replace consumption are heated and again pumped into the main). The highest velocities in the service pipe were obtained when the upstream orifice was equipped with a lip formation, especially so if the lip is shaped into a smooth curve.

"Design of Water Distribution Systems for Service in Arctic Regions". By William B. Page, Arctic Health Research Center. *Water and Sewage Works,* August.

Small-Diameter Rollers for Compacting Earth

A reservoir being constructed at Monterey Park, Calif. will be enclosed by an earth embankment which at one point is 170 ft. high and will contain 3,600,000 cu. yd. of earth. This is compacted with rollers especially designed by Ralph R. Proctor, field engineer of the Los Angeles Dept. of Water and Power. His theory is that compactive effort is proportional to drawbar pull, which increases as the roller drum diameter decreases and as the weight increases. Therefore each roller weighs 30,000 lb., 3,000 lb. per linear foot of drum, the diameter of which is small. It is figured that this roller puts 25,000 ft. lb. of compactive effort into the soil in 16 passes, which is the amount required in this job for compacting 6-in. lifts. Each roller, moving 3 mph can produce 200 cu. yd. of compacted embankment per hour.

"Fill Laid Fast With Small- Diameter Rollers". *Engineering News-Record,* August 19.



Courtesy Water & Sewage Works

● ORIFICE D is most efficient orifice when flow in main may be either direction; orifice H is most efficient for flow in one direction only; orifice J is simpler to construct than H and nearly as efficient.

Automatic Features Of a Filter Plant

Vallejo, Calif. is completing a modern system for supplying water to the city itself, to the cities of Fairfield and Suisun and Travis Air Force Base, and ranches and other users. The system includes two filter plants, one for Vallejo with a capacity of 21 mgd, and one for the Travis Air Base of 4.5 mgd capacity. The latter contains several automatic features. The turbidity will be measured with an electric eye. A potentiometer will regulate the flow of alum as the turbidity changes from hour to hour. Automatic washing will be controlled by means of loss-of-head gauge readings or by time clock. It is contemplated that only a single operator will be employed for the day shift and the operation will be entirely automatic the other 16 hours. Flow to the filters is automatically controlled to take place only as filtered water is drawn from the clear water basin. Instead of conventional operating tables there will

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be a panel board containing all necessary recording instruments. Electric controls will govern sequence timers and control all devices for automatic operation of the plant. The article also describes the larger filtration plant, with many interesting features, including flocculation and settling tanks which have been removing approximately 96 percent of the turbidity of the raw water, or reduction from 60—1,000 ppm to less than 4 ppm.

"Filter Plant and Water Supply for Vallejo". By H. L. Thackwell, *Public Works*, September.

Kansas City Curbs Use Of Water for Air Conditioning

Kansas City, Mo. was informed, in a report submitted last July, that the demand for water has grown 1,000 gpm due to the 333 tons of water-wasting air-conditioning coolers installed recently; and that, if use of water for non-conserving systems is not restricted, the water demand will reach 459 mgd by 1970, supplying which would cost at least $90 million. As a result, the city has adopted an ordinance requiring all new air conditioning installations to be equipped with water-conserving equipment and use not more than 6 gal. of water per hour per ton. To encourage existing plants to convert their wasting units to the conserving type, the city proposes to increase water rates for non-conserving units.

"City Puts Curbs on Air Conditioners in Alarm Over Increased Water Waste." *Engineering News-Record*, August 19.

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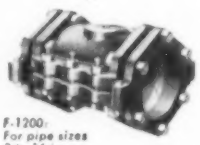

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Unusual Rock-Fill Dam

San Francisco's Public Utilities Commission and the federal government are building, on the west side of the Sierra Nevadas, a 7,000,000 cu. yd. rock fill dam known as the Cherry Valley dam. This dam is unusual in that the impervious core is larger than is usual. It is actually a composite earth and rock fill 320 ft. high and 2,635 ft. long at the crest. The use of a large impervious core was adopted by the designers because of the abundance, at the site of the dam, of decomposed granite, which is impervious when compacted and costs in place only half as much per cu. yd. as does rock fill. The dam might have been built of this impervious material but its necessarily flatter slopes and consequent broader base width would have required a longer dimension and outlet tunnel. The section designed is a compromise on tunnel and fill prices. The fill is compacted in 6-in. layers, each scarified before the next is placed. It is required that 100% of tests of compaction show a field density greater than 90% of maximum density of the soil, 90 percent of the tests must show soil density greater than 91 percent of maximum, and 50 percent must exceed 94 percent of maximum.

"Cherry Valley Dam Job Shifts Out of High". *Engineering News-Record*, August 26.

Preventing the Silting of a Reservoir

Shawnee, Okla. in 1936 built a reservoir costing $800,000 to serve as a part of the water supply system and also as a recreation center. The city owned 1600 acres surrounding the reservoir, and leased land on the water front for cabins and sold fishing permits. But almost at once, red soil began washing into the reservoir with every rain, mud bands formed, the water was a dirty red, and people avoided what they called the "mud hole". In 1950 a

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corrective program was mapped out, with the aid of the soil conservation service, and by 1952 the water was clear. Cabins were built, boat races were held, 10,000 fishing permits were sold, and the revenue from the reservoir was $5,076, compared to $1,792 in 1950. Also the cost of purifying the water dropped from $19,544 to $4,717, although the amount of consumption had increased 15 percent. The conservation program included seeding the surrounding land to grass and constructing 79 desilting basins and 12 miles of diversion terraces. Also, firebreaks were built to encircle the city-owned land. The entire cost of this to date has been $8,500.

"Reclamation of a Water Reservoir". By W. B. Moran, City Manager. *American City*, August.

Copper Sulfate For Algae Control

Eau Claire, Wis. contains within its boundaries a lake which, in the past, was used as a log reservoir by lumber interests and has a substantial amount of sawdust, bark and other wood fragments in the bottom and on the banks. Excessive growths of weeds and algae have created scum and obnoxious odors. The city had tried to eliminate this condition by use of copper sulfate, the dosage of which a state permit limited to 240 lb., or 0.3 ppm. This amount was applied in June 1953, when the algae count ranged from 550,000 to 2,500,000 per liter of water. This greatly reduced the count, but nine days later the customary scum had formed again and another dose of 200 lb. of copper sulfate was applied. Also 850 gallons of concentrated commercial sodium arsenate was sprayed over the dense weed areas, and within a week all the weeds had disappeared; but the algae still persisted. They then got state permission to increase the copper sulfate dose to 800 lb., and applied 600 lb. on July 28 and 800 lb. on July 30. By afternoon of July 30 the algae count had dropped from 1,750,000 per liter to 800,000 and within three days the water was clear. This treatment did not injure fish life nor did the dissolved oxygen content get below the danger point, despite the tremendous decay of algae. This treatment costs $500 to $1,000 a year.

"Out With the Algae". By Harold F. Anderson, Administrative Officer, City-County Health Dept. *American City*. August.

Metering Minimizes Unaccounted-for Water

Sheboygan, Wis. meters all services, including public buildings, and carries out a periodic meter testing and maintenance program. As a result, 90.9 percent of all water pumped into the distribution system was accounted for in 1953. The city now has in use 11,200 meters. The total number stopped for ordinary repairs averages about 90 a year. The maintenance program is described in the article. Meters are owned by the utility, and repairs are made free if necessitated by ordinary use. For sanitary reasons, water is never turned off because of nonpayment of quarterly bills; but if the arrears continue for a year, the amount due is added to the taxes for collection by the city treasurer.

"Planned Meter Maintenance Cuts Stoppages". *Public Works*, September.

Municipal vs Private Ownership

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For sewer lines over 10". Flexible cleans up to 2,000 feet per day, using one operation, power driven bucket machines.

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After World War II, geologists found one of the best well-field sites in central Illinois. Hardness was about 200 ppm, still far too high to satisfy taxpayers, far-sighted city officials.

So when well-field contracts were awarded, the project included a modern *water softening* plant. Consulting engineers recommended Permutit equipment.

Taylorville's Precipitator (shown at left) reduces hardness, turbidity and alkalinity in a single, quick step. Its efficiency greatly reduces filter loads, cuts backwashing to a minimum.

This Permutit installation reduces hardness to the specified range of only 60-80 ppm (a mere 4 grains) . . . a far cry from Taylorville's old 974 ppm level!

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Taylorville's 1500 gpm Permutit Precipitator. It softens and clarifies in *half* the space, ¼th the time of a settling basin.

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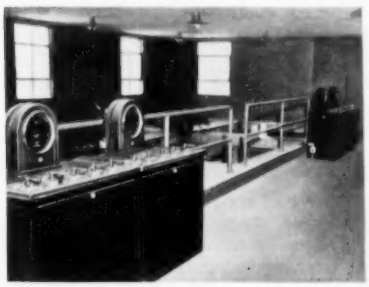

Taylorville's New Water Softening Plant
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the operation of municipal and of privately owned water utilities. In each case, service must be given to consumers, requiring the same number of employees. Material costs and operating expenses are the same, except that they may be less for a municipal authority which also operates the sewerage system. The financial differences include lower interest rates on bonds issued by municipalities and exemption of municipal authorities from payment of federal excise taxes. In some states, greater control is exercised over the activities of private water companies than of those municipally owned. The author refers chiefly to conditions in Pennsylvania.

"Water Works Management". By John H. Long, Mgr. Gettysburg (Pa.) Mun. Authority. *Water and Sewage Works*, August.

Other Articles

"**Spillway Aprons** Paved With Soil Cement," at flood-control dams in California. By John W. Bryant, Chf. Engr. Engineering News-Record, Aug. 5.

"**The Rio Grande Flood**, Sewage and Water Treatment Problems of." By R. H. Weiss, Dist. Engr., Texas State Dept. of Health. PUBLIC WORKS, September.

"**Repairing Leak** 200 Feet Under New York's Fifth Avenue." By Robert J. Devinney, Borough Engr. Water Works Engineering, August.

Ion Exchange regeneration by sea water. "Softening and Regeneration Process Takes on New Look." Water Works Engineering, August. (See **Digests** for September.)

"**Precipitation**—How to Make and Measure It." Water Works Engineering, August.

"**Regional Needs**, Metropolitan Water Systems Now Serve." Water Works Engineering, August.

"**Centrifugal Pumps**, Designing, Constructing and Maintaining." By Roy Carter and Igor J. Karassik, Eng'rs Worthington Corp. Water and Sewage Works, August.

• • •

Home Incinerators Help Solve Refuse Problem

GORDON E. OLSON,
Village Manager
North St. Paul, Minn.

JUST before the garbage cooking requirement became effective by state law in Minnesota, the hog farmer who had been collecting the garbage in North St. Paul decided to discontinue his service. The council instructed the mayor and manager to investigate garbage handling procedures and report back.

It was found that there were four applicable basic methods of handling garbage; hog farmers, private garbage pick-up contractors, village collection pick-up, and home disposal units. North St. Paul had been paying about $2400 a year to its hog farmer for collections and this was cheaper than any of the other methods studied. Private collectors made tentative bids for a contract to pick up and dispose of the garbage, these bids running from $6,600 to $18,000 a year. These figures encouraged further examination of other methods.

If the village acted as its own collector the problem of disposing garbage would immediately arise. Three solutions to this problem were considered: a sanitary land fill, a central incinerator, and a central grinding station.

The land fill method was appealing as low swampy ground could be used and the land made more useful through this process. Future

THE FISH WHICH GOT AWAY MAY BE EXAGGERATED

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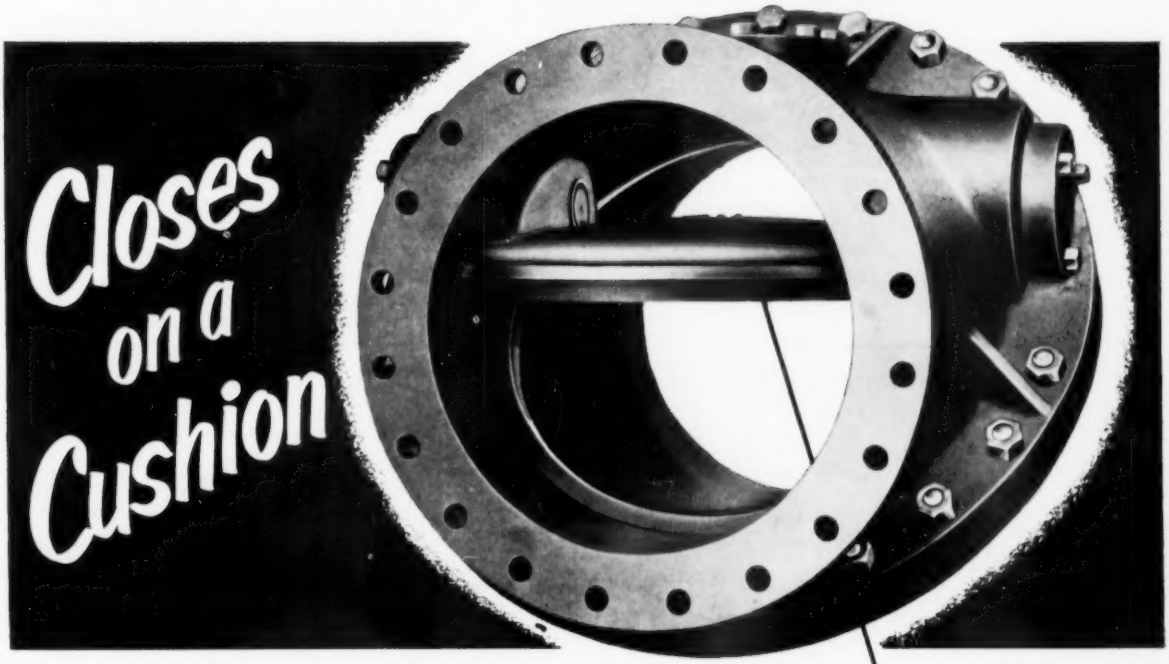

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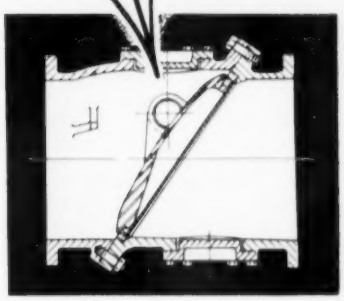
Balanced pressures *cushion* the movement of the disc in Chapman's Tilting Disc Check Valve. The valve closes quickly but quietly, in all but unusual piping arrangements. There's no slamming to damage pipe-line joints or the valve itself. And *drop-tight* closure eliminates sliding wear on the disc and seat.

In the open position, the "airfoil" designed disc rides firmly against stops, without swinging or fluttering. That's why the hardened extra-large hinge pins give extremely long wear. And the absence of turbulence is one reason why head loss through Chapman's Tilting Disc Check Valve is lower than through any other type of check valve.

Low head loss, increased wear resistance and freedom from destructive slamming make Chapman's Tilting Disc Check Valves unbeatable for almost every installation. Write for Catalog No. 30 today.



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CHAPMAN Tilting Disc Check Valves
***Keep Quiet* All Their Lives**

This specially designed "airfoil" disc balances perfectly in open position . . . then drops easily to closed position (cushioned by the flow). No jarring or slamming, in usual pipe-layouts. Write for bulletin.

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considerations caused some hesitation. As sites in and near the Village were filled it would be necessary to go further and further away. This, in turn, would increase transportation costs, a real factor. There would always be a problem with those people living close to the disposal area who would claim a blight on their property from the proximity of the sanitary land fill. Regardless of those factors it was estimated that the Village would fill five acre-feet per year, with a three-foot lift. Whether or not the same site could be used more than once was disregarded, and a nominal value of $100 an acre was assumed for the cost of the land. In addition to the land certain equipment would be required. Since the Village owned a drag line, only a bull clam was considered necessary additional equipment in the operation of the site. Such a piece of machinery would cost about $5,000 and the annual figure for operation, depreciation, etc., would be about $500. Land and machine costs for the sanitary fill therefore would be about $800 a year. The employees collecting the garbage would be expected to operate and care for the site, thus avoiding additional personnel.

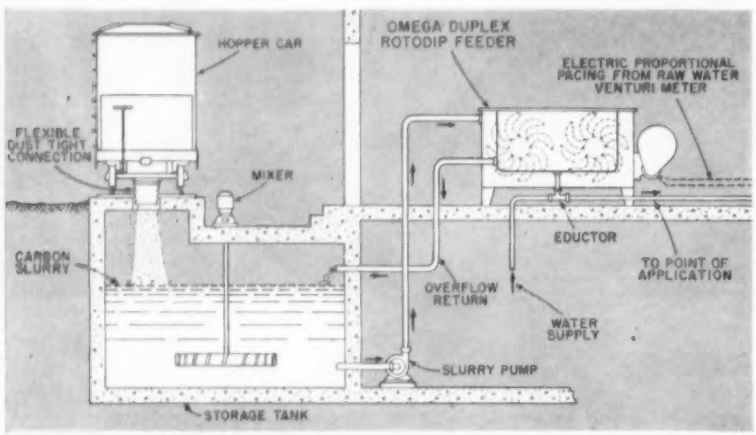
Incinerator costs depend on the capacity of the unit. Available figures estimate the building cost (by ton of rated capacity) at $1,000 per ton on a twenty-four hour day. Anticipating a requirement for two tons a day, it would be necessary to plan for a rated capacity of six tons in order to dispose of the garbage in eight hours. In addition to the building we would need to purchase land. The incinerator would cost about $6,000, the land $1,000, and the man to operate the incinerator about $3,000 a year. As the incinator would be a long term capital investment, for purposes of computing annual costs only one-twentieth was used for write-off each year or $300. The total yearly outlay would be $3,300 for the incinerator method. The land would not be written off.

A centralized grinding station would require a $5,000 building, $3,500 grinder, and a $7,500 wet well and grit washer. Writing off the building over a twenty-year period would amount to $250 a year. The grinder and wet well were estimated to last ten years, with a depreciation of $1,100 a year. Again a man to operate and maintain the station was estimated at $3,000 a year. Total annual expenditure would then be $4,350 for the centralized grinding station.

However, in the case of the sanitary land fill, incinerator, and centralized grinding station the village would need to provide facilities to collect the garbage. A chassis and load-pack body of about ten yards capacity would cost in the neighborhood of $8,500. Annual depreciation would be about $750. To go with the truck a truck driver at $3,300 and two pick-up men at $3,000 each would be required. The cost for the collection service would be $10,050 a year. To this figure then would be added the annual cost of the sanitary land fill, incinerator, or centralized grinding station to yield the total annual cost of operating a village garbage system.

At the present time Minnesota laws do not allow communities to participate in the cost of installing home grinding units or disposal units such as home incinerators.

The initial cost involved in purchasing either the so-called sink grinder or the home incinerator is approximately the same. On the insistence of the community of Jasper, Indiana, the Indiana State Legislature passed permissive legis-

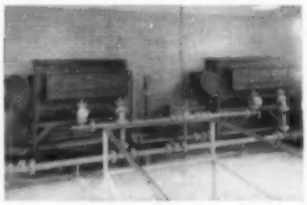


Houston shows how to cut carbon handling costs

Activated carbon for controlling the taste and odor of Houston's water supply is received in carload lots at the Houston Water Purification Plant. As shown in the diagram, the carbon is then fed in slurry form by Omega Rotodip Feeders, the super-accurate solution feeders which are specially designed for this type of service. This modern chemical feeding system provides:

1. **Reduced handling costs** — carbon is dumped directly into storage tanks and then handled in an enclosed system to point of application.
2. **Reduced construction costs** — system permits below-ground storage.
3. **Great flexibility** — wide feeding ranges and large dosages are easily obtained.
4. **Simpler housekeeping** — system totally eliminates carbon dust.
5. **Greater safety** — fire hazards virtually eliminated.

Carbon slurry feeding is another example of how "The Last Word in Feeders" save money in the feeding of chemicals. For further information on this and other advanced types of dry and liquid chemical feeders, write Omega Machine Co., 356 Harris Ave., Providence 1, Rhode Island.



Omega Duplex Rotodip Feeders for carbon slurry at Houston. Plant also employs Omega Gravimetric Feeders for alum, ferrifloc, quicklime, and soda ash.

Chemical Building which houses Omega Rotodip Feeders. Engineering was by Freese, Nichols & Turner — of Houston, Texas . . . installation by E. W. Bacharach, Inc., Kansas City, Mo.

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Comparative Costs of Disposal Methods

	Initial Investment	*Annual Outlay*
For the Village		
Hog Farmer	None	$2,400
Private Collector	None	6,600 to 18,000
Sanitary Land Fill	5,300	10,550
Centralized Incinerator	10,000	13,350
Centralized Grinding Station	16,000	16,400
*For the Home Owners**		
Home Disposal Unit	125	12
Home owner paying for collection to hog farmer		5 (container) 12

*Figures are estimated as average. The annual expense assumes fuel consumption (gas or electric) for a year.

lation allowing the community to assist in the cost of home units. It might be that this will be copied, even though Jasper did not find it necessary to rely on this method of financing. Other communities are passing ordinances requiring new homes to have home units of garbage disposal. It is suggested here that home disposal of garbage is a trend that will continue and eventually eliminate the "sanitary" collection of garbage by man.

The Village of North St. Paul has a contract with the City of St. Paul to dispose of the Village's sewerage through St. Paul's sewer mains to the metropolitan disposal plant handling the twin-city area. The possibility that St. Paul might ban home grinding units encouraged the Village to consider the other alternative of home disposal, the incinerator. One manufacturer agreed to install his equipment throughout the Village at near cost basis in anticipation of mass sales. These were indoor installations. Most of the appliance dealers in the Village participated in the program and several hundred units were sold.

The table herewith shows comparative costs on the methods discussed.

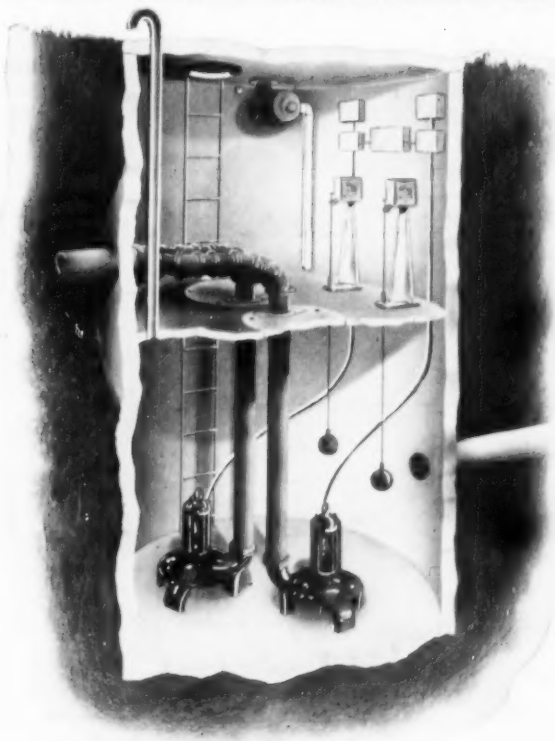
While arrangements were being made to change the method of garbage collection, the hog farmer reconsidered and agreed to continue collection from homes on the basis of a $1.00 a month for a ten-gallon container for each family. With about five hundred customers the total cost of this service could be $6,000 a year. The Village now has two means of handling the garbage problem . . . the hog farmer and the home incinerator. Those who have installed the home incinerator seem well pleased and like the convenience of ignoring the garbage collection schedules and weather.

• • •

Automatic Traffic Control for Fort Wayne

An automatic traffic control system is being installed by Fort Wayne, Ind., which will regulate the traffic light cycles according to the number of cars using the streets. The cost will be about $70,000 for the system.

The SUBMERSIBLE SEWAGE EJECTOR



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PUBLIC WORKS DIGESTS

THE HIGHWAY AND AIRPORT DIGEST

Specifying Results In Highway Contracts

In a discussion by a number of highway engineers on the subject of specifications for highway construction, most of them emphasized the importance of conveying the end results sought rather than detailing procedures to be followed or equipment to be used. This encourages the exercise of ingenuity and inventiveness on the part of contractors and manufacturers. Changes of the language of specifications should be made with caution; where the existing language has come to be uniformly interpreted, a change may actually result in confusion.

"Keeping Specifications Up To Date", *Better Roads*, August.

Depressed Combination Storm-Water Inlets

Tests for investigating the hydraulic behavior of five types of grates used as part of a depressed combination storm water inlet were made at John Hopkins University, using a 1:3 scale model. Studies were made of the effect on inlet efficiency of the type of grate, and of the position of grate relative to curb opening. The grates tested had bars either longitudinal or transverse, some with and some without cross bars as stiffeners across the bars. Conclusions reached were that a grate with longitudinal bars gives the best hydraulic arrangement when the use of a depressed combination inlet is considered desirable. For gutter flows up to 5 cfs inlet capacities cannot be increased by locating the grate either up stream or down stream from the curb opening; for higher flows and low street slopes, capacity can be increased by a tandem arrangement of grate and curb opening. When using grates with transverse bars, some increase in capacity is obtained by putting the grate either upstream or downstream from the curb opening; but increased efficiency is accomplished much more readily by using a more efficient grate.

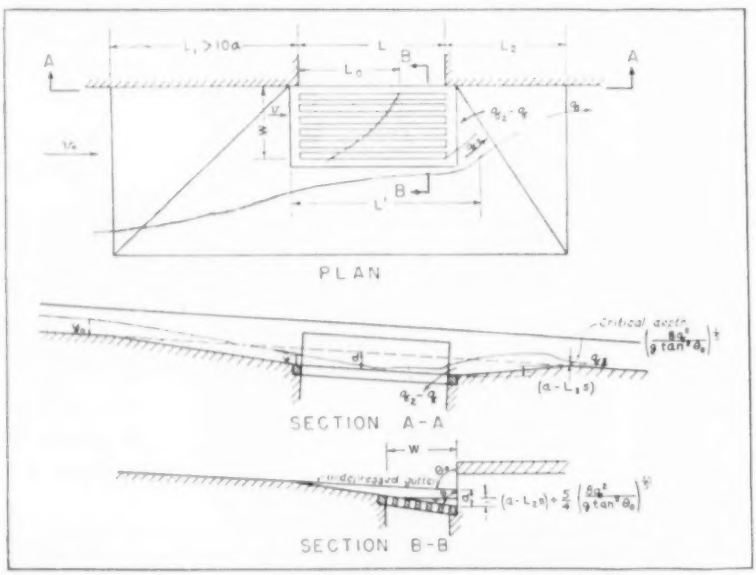
Where gutter depressions are not desirable, as along express highways, or on urban streets where the lane close to the curb is used for traffic, curb inlets with deflectors may be used on steep streets, and undepressed combination inlets in streets of mild slopes.

"Hydraulic Behavior of Storm-Water Inlets". By Wen Hsiung Li, Bertram C. Goodell and John C. Geyer, Johns Hopkins Univ. *Sewage and Industrial Wastes*, August.

Fabric Reinforcement of Asphaltic Concrete

Several highway departments have used roll fabric for reinforcing asphaltic concrete, and have had trouble keeping it flat on the road surface while the asphalt mix was being placed by machine. Several methods have been devised for overcoming this trouble. In Texas the Beaumont District lays a 300-ft., 11½ ft. wide, roll of fabric in place, then stretches it to eliminate the bulges. To do this, a ⅜-in. round rod was interlaced in the fabric at each end. The rod at the beginning of the roll was held in place by 4 or 5 short steel pegs driven into the pavement. The rod at the forward end was pulled forward by a tensioning device and held in tension temporarily while the asphalt mixture was being laid. The next roll was connected to the first by weaving a rod through the overlapping ends. Remaining bulges in the fabric were ironed out by the weight of a steel plate 12 ft. long suspended under the Adnun paver just ahead of the spreader. Persistent bulges were remedied by crimping a wire here and there in the fabric.

In Colorado a "hold-down" device is used consisting of two steel plates about a foot wide attached to the



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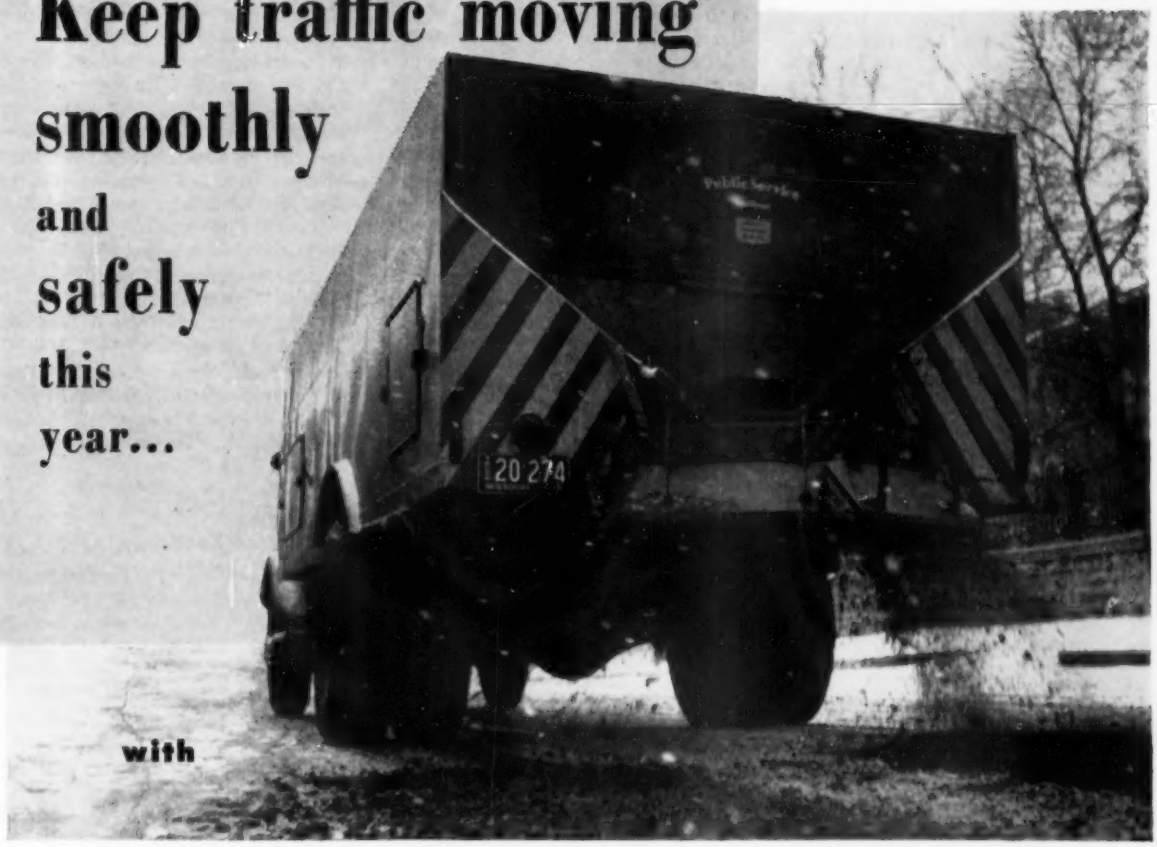

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paver outside of the cat tracks, and another steel plate 10 ft. long at the front of the asphalt finisher between the tracks extending back to the conveyor screw. Compression springs between these plates and the finisher held the fabric flat just ahead of the conveyor screw.

"Reinforcing Asphaltic Concrete With Roll Fabric." *Public Works*, September.

Corrugated Culvert Under 137 Feet Fill

Three corrugated multiplate pipes have been placed under a fill with a maximum depth of 137 feet to carry a creek under U.S. Route 31 in Alabama. The pipes are 7 ft. in diameter. The steel plates are 0.281 in. thick in the center of the culvert, thinning out to 0.172 in. at the ends. The pipes rest on a bed of granular material 2 ft. thick compacted to 100 percent density. The backfill around and for 3 ft. above the pipes was selected material compacted to 100 percent density with sheepsfoot rollers and the use of air hammers close to the pipe. Above that, the normal fill of earth, rock and sandstone was placed in layers and rolled. Before the fill was placed, the vertical diameter of each pipe was increased 3 percent by means of struts placed at 3 ft. centers in the mid-section of the culvert and 6 ft. centers at the ends. When the fill had been completed, the struts were removed and the vertical diameter remained ½ percent to 2½ percent elongated. Analysis of strain gauge readings showed greater loads at points where fill material was repeatedly brought in over the pipe at one place, from which it was concluded that, in constructing large fills, it is desirable to place material in horizontal layers and compact it uniformly.

"Corrugated Culvert Proves Successful Under Pressures of 137-ft. High Fill". *Engineering News-Record*, July 29.

Dynamic Testing of Roads

Recent evidence suggests that bituminous mixtures are subject to fatigue and the allowable flexural stress will depend upon the number of repetitions of the load. Therefore a full investigation requires a determination of the stress and strains in a road carpet under moving wheel loads; of the relation between stress and strain under dynamic conditions; and of the fatigue strength of bituminous materials. To make such a study, a vibration machine was developed at the Amsterdam Laboratory of the Royal Dutch Shell Group, which was used at a number of sites in both Holland and Britain; in the latter country by its Road Research Laboratory. A tentative theory has been developed which is described in this article, although there is admittedly need for further theoretical and experimental study.

"Investigation Into the Dynamic Testing of Roads". By L. W. Nijboer, Amsterdam Lab, and R. Jones, Road Research Lab. *Roads and Road Construction* (England), July.

Herbicides in Roadside Maintenance

Most of New Jersey's state highways have been completely graded and seeded, and frequent mowings reduce undesirable weeds to a minimum. But in roadside picnic areas and on township and county roads 2,4-D and 2,4,5-T are used to a good financial advantage. It is especially desirable to eliminate ragweed and poison ivy, which are a hazard to highway maintenance workers and to owners of abutting property.

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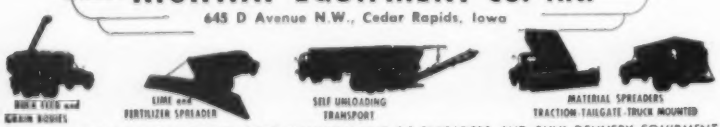
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Compared with hand cutting of brush, which costs $200 to $400 per mile every second or third year, the chemical spray method costs $35 to $40 per mile for the first year, $25 the second year and $10 the third year. Brambles and berry bushes are best controlled with 2, 4,5-T, "Ammate" weed killer, used on large informal bay areas and the edge of woodlands gives 95 percent to 100 percent control within ten days or two weeks. Experimental use of MH (Maleic Hydrazide) as an inhibitor of grass growth is being watched as a possibility of reducing mowing cost by as much as $70 per acre per season; with its use only 2 mowings per year were required as compared to 10 on check plots.

"Highway Roadside Maintenance Cost Reduced by Chemicals". By Oliver A. Deakin, N. J. Highway Authority, *Public Works*, September.

Sealing Highways with Diluted Asphalt Emulsions

Two divisions of Texas state highways have been using a mixture of HVMS asphalt emulsion and water instead of the usual MC-1 prime as a method of applying very thin films of asphalt. This is used as a prime on bases, and to prevent raveling and hair cracks in old pavements and postpone indefinitely the need of a seal coat. Best results appear to be obtained by applying a mixture of residual asphalt so diluted and at such a rate as to leave approximately 0.02 gal. per sq. yd.; making as many applications as field conditions seem to require. Each application should be allowed to break and cure completely before a succeeding application, and traffic should be kept off for 30 to 60 minutes to prevent its picking up the asphalt film.

"Diluted Emulsion Surface Seals for Highways". *Public Works*, September.

Compacting Concrete Roads

When compacting with a vibrating screed sliding along the forms, some of the surcharge concrete may be screeded off, which results in poor compaction. The English Road Research Board conducted some experiments to determine what shape and operation of compacting beam could best compact slabs 8 in. and 6 in. thick. They concluded that: (1) To obtain full compaction in a slab 8 in. thick the vibrator must be moved forward in steps and lifted on to the spread concrete at each step. (2) Full compaction in a slab

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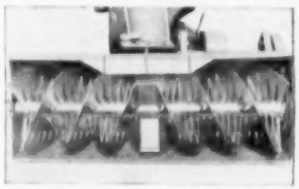
*Mounts readily on most wheel-type tractor front end loaders, replacing loader bucket and using same pins. (Other hitch applications on request.) New model for Jeeps now available.



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6 in. thick can be obtained if the vibrator is tilted or is fitted with some form of leading edge and allowed to slide along the forms. The most practical arrangement appeared to be the provision of a half round toe on the leading edge. (3) If no leading edge is provided and a plain rectangular beam is used a second pass of the vibrator will be required as well as a finishing pass in order to obtain full compaction of a slab 6 in. thick, with a consequent reduction in output and an increase in cost.

"Effect of Methods of Using Small Vibrating Screeds on the Depth of Compaction of Concrete." By R. H. H. Kirkham, Road Research Laboratory. *The Surveyor*, August 7.

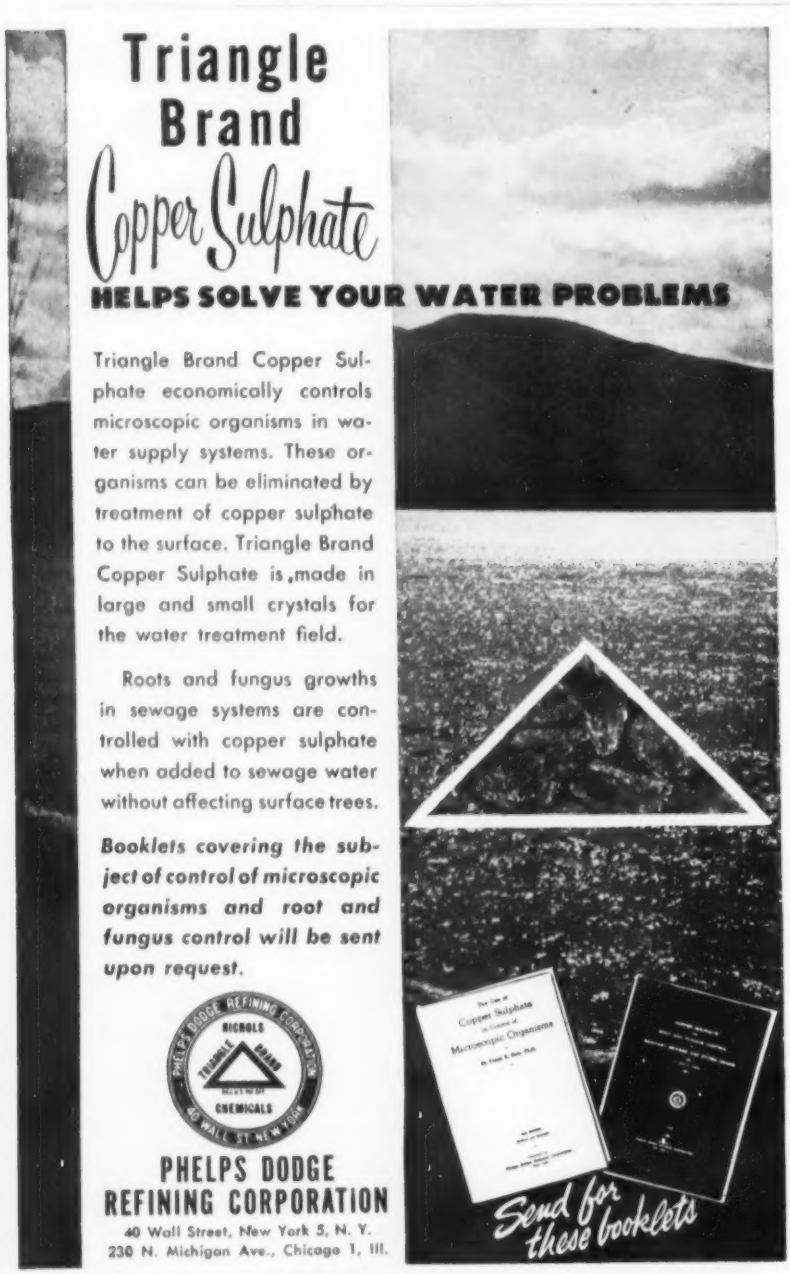
Suggestions for Asphalt Paving Work

Several state highway departments were asked for suggestions on how to get a good lay-down on asphalt paving work. Among the suggestions received were the following: "A large portion of our trouble in securing a satisfactory job can be traced to finishers which are not kept in proper operating condition." (N. Dakota). California said that the aggregates used should be as non-absorptive as possible, have the least tendency to degrade under the use expected; and that the amount of 200-mesh material be kept below 5 percent. Blade laying of mixes is impracticable when the harder grades of asphalt are used. In rolling open-type mixes, the first rolling should be made as early as possible, with an ironing out when the pavement is cooler. In Virginia a considerable amount of bituminous hot mix resurfacing is done, either to replace a worn existing surface or to improve the riding qualities of the pavement. This is usually put down in two lavers, the first for the sole purpose of eliminating depressions and improving the roadway cross section, for which the quantity used is the minimum that will secure these results—usually 65 to 75 lbs. per sq. yd. In applying the wearing course, rolling follows the paver as closely as possible, followed by a second roller to iron out any roller marks. Extreme care is taken to prevent traffic from stopping or making sharp turns or sudden starts on the new pavement.

"Getting a Good Lay-Down on Asphalt Paving Work". *Roads and Streets*, August.

Paving a Prerequisite For Annexation of Subdivisions

Raleigh, N. C. encourages the annexation of subdivisions as advantageous to both the city and the developer under certain conditions; the most important of which, from the city's viewpoint, is that the streets are so paved that the maintenance of them will not be unduly expensive. It makes an agreement with the developer of a proposed subdivision to annex his subdivision and remit all water and sewer service charges and to participate in the installation of water mains larger than 8-in. provided the streets are paved in accordance with the specifications followed in paving the city's streets. The city pays the cost of paving any given street in excess of what it would cost to lay a residential type of pavement 27 ft. wide. The widths of pavement are specified by the city, ranging from 27 ft. for residential streets to 45 ft. for major arteries. If no previous agreement has been made with the developer, he has to pay all costs of paving and water and sewer service in his development. This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plan permits the proper coordination of all streets, allows for overall city planning, and indicates what needs there are for such facilities as belt boulevards.

"Paving—A Key Element in Subdivision Regulation". By J. L. Morrison. *Public Works*, September.

Separation of Gravel by Flotation

In a study of the relation between pavement durability and certain characteristics of coarse aggregate, the tests of crushed stone aggregates showed that the nondurable ones were characterized by high porosity, especially in the voids smaller than 0.005 mm. Samples of crushed stone which are representative of the output of a quarry can be obtained for testing; but gravel aggregates found in Indiana are heterogeneous mixtures of many types of rock, some durable and some not. It is thought that the deleterious constituents are highly porous and therefore of low specific gravity and separable from the rest by flotation in heavy liquids. In the studies described, the liquids used were carbon tetrachloride (sp. gr. 1.58) and acetylene tetrabromide (Sp. gr. 2.97). By mixing these, any specific gravity between these limits can be obtained. Tests indicated that particles having a specific gravity less than 2.55 were unacceptable, while those of higher specific gravity were acceptable on the basis of absorption and degree of saturation—characteristics thought to be responsible for decomposition by freezing. The possibility of heavy-medium separation of deleterious particles indicates that commercial methods might be used to produce better gravel aggregates, and that specification limits on deleterious particles in gravels might be set as a maximum percentage lighter than a given specific gravity value.

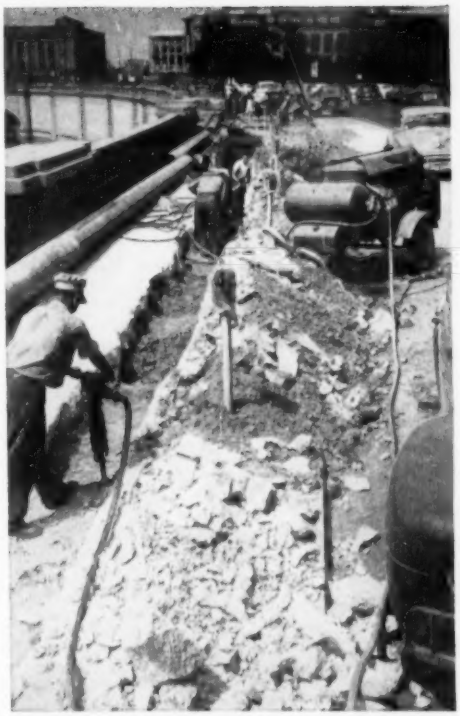
"Heavy Media Separation of Gravel". By D. W. Lewis, Research Engineer, Joint Highway Project, Purdue Univ. *Roads and Streets*, August.

Other Articles

Snow handling in Duluth, Minn. "Making Modern Living Normal in the Snow Belt." By Arthur W. Tews, City Engr. PUBLIC WORKS, September.

"Traffic-Actuated Signals Handle High Traffic Volumes, Three-Phase." By G. M. Webb, Calif. Div. of H'ways. PUBLIC WORKS, September.

"Analysis of Asphalt Mixtures, The



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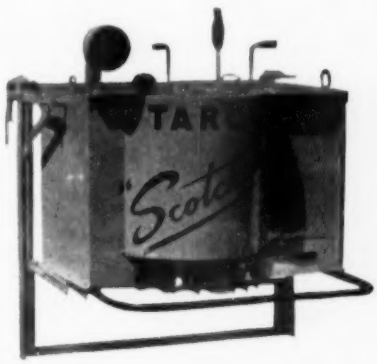

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Rapid." New method of determining soluble bitumen content. By D. H. Bax. Highways and Bridges (England), July 21.

"Bridge Finishers Pave Ohio Turnpike's Longest Structure" with concrete 8½ in. thick. Roads and Streets, August.

"President's $50 Billion Road Program Stirs Controversies." With editorial discussion. Roads and Streets, August.

Public relations a highway department duty. "Our Big Job—Selling the Man on the Street." By Duane L. Cronk. Roads and Streets, August.

Aggregates for base of heavy flexible pavement. "Heavy Flexible Pavement Base for Big Jets." Roads and Streets, August.

"Aggregate Specifications, Needed—A Sense of Proportion on." By H. G. Nevitt. Roads and Streets, August.

"Aerial Photographs For Highway Location, How Alabama Uses." PUBLIC WORKS, September.

"Prestressed Concrete Roads." General and technical discussion. By G. Isaac. Contractors Record (England), Aug. 4.

"Job Planning" pays handsome profits. By W. B. Edwards. Contractors Record (England), July 28.

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This is a new re-surfacing technique—asphaltic concrete reinforced with welded wire fabric—which is described in a 42-page booklet, "Welded Wire Fabric Reinforcement for Asphaltic Concrete Resurfacing over Concrete Pavement Slabs". It is published by the Wire Reinforcement Institute, Inc., 1049 National Press Bldg., Washington 4, D. C. Copies will be sent on request to the Institute.

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Welded designs of comparable riveted bridges either existing or proposed, compiled from a bridge design competition. Drawings and designers comments are included. 211 pages, stiff board, cloth covered binding, $2.00 from The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.

ASTM STANDARDS ON CEMENT

This 1954 compilation of ASTM Standards on Cement (with related information) brings together in compact, readily usable form, 23 test methods; 9 specifications; and 2 definitions: one for the term addition as applied to hydraulic cement, the other for the term pozzolan. Appendices include information on analytical balances and weights, a manual of cement testing, a list of selected references on portland cement, and an article on "The Principle of the Methoxyl Method for Determining Vinsol Resin in Portland Cement." 254 pages, heavy paper cover. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $2.75.

CALCIUM CHLORIDE FOR STABILIZATION

This manual was written to assist highway engineers, contractors, and materials suppliers when they use calcium chloride in the construction of dense graded bases and wearing courses. It deals with properties and design, types and methods of construction, and specifications. All information is presented as a guide for both design and construction engineers. 34 pps, 1st edition. Calcium Chloride Institute, 909 Ring Bldg., Washington 6, D. C. Ask for Manual SM-1.

Clearing a Heavily Wooded Reservoir Site

TO form a reservoir of about 2.2 billion gallons capacity on the Mianus River, near the New York-Connecticut line, the Greenwich Water Company is building a dam and is clearing the reservoir site of about 225 acres. The area is quite heavily wooded. E. H. Aldrich, chief engineer of the American Water Works Service Co., Inc., which is directing the work, has sent us the following information.

"Specifications require that the reservoir area to be cleared of all trees, timber, brush, weeds, etc., within the reservoir area to a line about three feet above normal spillway level. This distance is being held to a minimum to preserve as much as possible the existing timber growth and wilderness-like character of part of the area located in the Mianus Gorge containing trees several hundred years old.

"Stumps of all trees over 2 inches in diameter are cut within 6 inches of the ground. Small trees and brush are being pulled, burned or otherwise eliminated. All brush and other materials not usable are being completely burned.

"The Contractor has imported crews of experienced northern lumberjacks and a saw mill has been erected on the site. Substantially all usable material, of hard and soft woods, is being disposed of for furniture, lumber, cord wood, pulp wood and fencing posts. Even the sawdust is being sold.

"We are not attempting to grub or strip the reservoir area, except under dam embankment or borrow areas, inasmuch as water from this reservoir will not be used directly therefrom, but will be allowed to run downstream to a filter plant being built below or will be diverted to other reservoirs of the system."

Further information, covering the methods of cutting and utilizing the timber have been sent us by Homelite Corp., whose new model chain saws were used for felling and cutting up the trees.

"This area represents part of one of the last sections of natural wilderness in this vicinity. The forest, so dense in many places that walking is practically impossible, contains many trees measuring well over four feet in diameter.

"The crew consists of forty men, mostly French-Canadians, from the Eagle Lake section of Maine. They work in groups of four or five, one man with a chain saw felling and bucking, another with an axe trimming brush, marking lengths and driving wedges. The others, working with one or two horses or a small bulldozer, skid the logs and load them on a truck or on a sled which is dragged to the sawmill with a bulldozer. Five or six such groups are kept busy ten hours a day feeding logs to the sawmill. The mill, employing eight, has been set up in a central location and turns out between 10,000 and 12,000 board feet a day—hickory, oak, poplar, birch, maple, ash, beech, tulip and hemlock. After all marketable logs have been sent to the mill, the pulpwood is taken out. The remaining brush and wood is piled by bulldozer and left to dry and burn. Every thing from cutting brush to felling a 50-in. tulip tree (the largest taken out so far) has been done with the Homelite saw, all six of which have 20-in. guide bars."

Merritt, Chapman & Scott Corp., the general contractors, subcontracted the clearing job to the Woodridge Lumber Co. of Stamford, Conn. Charles Hickey is in charge of the work and Roy Hill is foreman of the loggers. The saws used were the new model 17, made by Homelite.

Aluminum Alloy Tapping Machine

The new HAYS Model B Tapping Machine, now made of High Strength aluminum alloy, is light, compact, efficient. The HAYS Machine takes up less room in the ditch, requires fewer operations, is easier to handle, easier to operate, speeds up installation of all standard makes of corporation stops.

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PUBLIC WORKS DIGESTS

THE SEWERAGE AND REFUSE DIGEST

Microstraining A Filter Effluent

At Baltimore's Back River sewage treatment works experiments have been conducted with the use of a microstrainer in removing fine suspended matter from the effluents of trickling filters and of humus tanks. The fine screen was a cylinder 2 ft. 6 in. in diameter by 2 ft. 3 in. long covered with a stainless steel wire fabric woven to give 75,000 apertures per sq. in., each formed as a triangle 35 microns long. One end of the cylinder was closed. The liquid entered the upper end and flowed out through the screen, leaving suspended matter on the inside, from which it was washed by a continuously flowing spray of water. The results of screening humus tank effluents were inconclusive. When screening trickling filter effluents, the removal averaged 56.1 percent when operated at 30 sec. per revolution, and 58.9 percent when operated at 50 sec. per revolution. The suspended solids content of the effluent from the screen was comparable with the effluent produced by the mechanically cleaned humus tanks at the plant.

"Operating a Sewage Microstrainer". By C. E. Keefer, Deputy Sew. Engr. *Water & Sewage Works*, August.

1,100 Acres of Oxidation Ponds

Auckland, New Zealand, in July adopted a plan for treating its sewage which includes a larger oxidation pond installation than has ever been constructed—four ponds with a total effective area of 1,100 acres. Auckland has a mean annual temperature of 59.4° and mean rainfall of 51 ins. per year—conditions highly favorable to oxidation pond operation. Other elements of the proposed works include bar racks, Venturi flume, preaeration and grit removal tanks, sedimentation, sludge digestion tanks, sludge lagoon and auxiliary trickling filters. Part of the effluent from the sedimentation tanks is circulated to the trickling filters, for the purpose of reducing a portion of the high BOD. About 80 percent of the sludge digestion will be accomplished in digestion tanks and final digestion in a lagoon—a volcanic cone which has a storage capacity for more than 50 years. The population in 1951 was 127,400 and is estimated to reach 777,000 by the year 2,000. The plan was recommended by three California engineers—David H. Caldwell, Prof. Charles Gilman Hyde, and A. M. Rawn, and H. Wilson, of London. J. T. Calvert, another member of this panel, submitted a minority report recommending a plan which included an activated sludge plant on an island in the harbor to be reached by a subaqueous line more than a mile long.

"$25 Million Sewage Plan in New Zealand". *Engineering News-Record*, August 26.

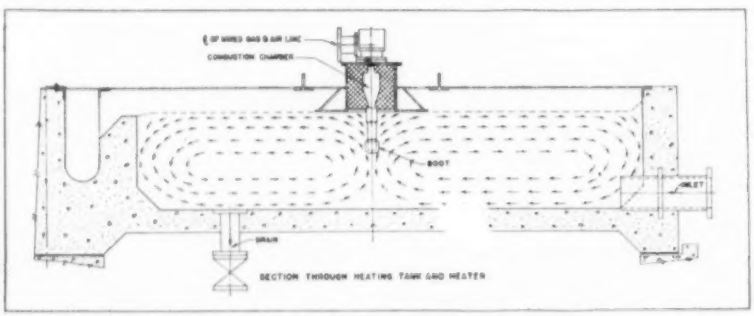
Laboon Process For Charlotte, N. C.

It is believed that Charlotte will be the first city to operate a plant utilizing the Laboon process of sludge concentration by flotation under controlled temperature. Such a plant is under construction for Pittsburgh and its environs, but will not be completed until after the expected completion of the much smaller Charlotte plant, designed for a flow of 11 mgd. Sludge from primary clarifiers will be heated to 95° as it passes through an external-type heater on its way to 4 concentration tanks, each of which will have a capacity for one day's sludge. It is believed that a concentration of 12 percent solids is as thick as it is desirable to handle before transferring it to the digestion tanks, and will substantially extend design capacity of digesters and drying beds. It is thought that the concentrated sludge can be fed to the digesters at a very nearly uniform rate and temperature, conditions optimum for digestion.

"Plant Adopts Laboon Process as Sewage Treatment Tool". *Engineering News-Record*, August 26.

Submerged Sludge Heating

A new process of heating sewage sludge forms part of the Northeast and Southwest sewage treatment works at Philadelphia, Pa., the former now in operation, the latter under construction. This method was adopted to provide more efficient heat transfer than do existing processes, maintain the proper temp-



Courtesy Sewage & Industrial Wastes

● **SCHEMATIC** section of submerged combustion sludge heater.

This Duo Clarigester-Duo Filter Team is installed at a restaurant and service area on the Pennsylvania Turnpike

Here's an actual case history that speaks for itself. Complete treatment including sludge digestion was required for a population equivalent of 3000. The consulting engineer designed two alternate plants . . . one using conventional equipment and one using Dorr "Duo" units. This is the breakdown:

ALTERNATE #1

One 30' dia. Duo Clarigester
One 38' dia. Duo Filter

TOTAL — 2 UNITS

ALTERNATE #2

Two 22' dia. Clarifiers
Two 27' dia. Filters
One 30' dia. Digester

TOTAL — 5 UNITS

And don't forget — both plants were designed for the *same* flow, to provide the *same* degree of treatment. Obviously, Alternate #1 was selected for the job on a lower first cost basis. Plus factors were substantial savings in space and the simplified operation inherent in Clarigester design.

The Dorr Duo Clarigester and Duo Filter are ideal equipment combinations to treat domestic and industrial wastes from population equivalents up to 5000. Skilled operators are not required, and over and underloads will not upset the balance. We'd like to send you more information on these cost-cutting units. Write for Bulletin No. 7313 to The Dorr Company, Stamford, Connecticut.

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erature control under varying conditions, eliminate sludge caking on coils, and corrosion of various parts of the heating system, and simplify inspection and maintenance. Using this method, raw unheated sludge is passed through tanks 12 ft. long by 5 ft. wide by 2 ft 8 in. deep. Sewage gas is burned in a combustion chamber on the top of each tank. The hot gases produced by this combustion are discharged directly into the sludge at temperatures of approximately 2700°F. and at a high velocity. This results in considerable turbulence of the sludge in the tank and an efficient heat transfer. The heated sludge is pumped to the digesters. Gas from the digester is mixed with the right amount of air in a combustion control unit, and the mixture enters the combustion chamber at a pressure of approximately 20 in. w.c. Here it is ignited and the mixture finds its outlet through a diffuser or "boot" extending into the sludge tank, with velocities estimated at 25 to 30 ft. per sec.

The Northeast works contains seven of these heaters, five of which are used at a time in winter to heat 300,000 gpd of sludge having a temperature of 50° to 55°F; and two in summer, when the sludge temperature is 75°. There has been very little trouble with these heaters. They are readily cleaned by taking a tank and burner out of operation for one day. They have been quite successful, giving good digestion temperatures (95° to 100°) with no noticeable odors from the exhaust stack. The thermal efficiency is estimated to be about 85 percent.

"Submerged Sludge Heating at Philadelphia's Northeast Works". By Samuel S. Baxter, Com'r, and Herman F. Horlacker, Mech. Engr. Philadelphia Water Dept. *Sewage and Industrial Wastes*, August.

Use of Lime In Digestion

The practice of liming digestion tanks to overcome so-called "starting troubles" or to keep old units in satisfactory balance was generally accepted as beneficial until about 1945-50; but recently has fallen into disfavor. The authors made a laboratory study of the subject using 3-gal. bottles as digesters of both primary and activated sludges. Since the volatile acids are responsible for the difficulties in digesters which make it desirable to add lime, they were used as a convenient basis for determining lime requirements. It was concluded that these studies showed that the addition of lime is a practical means of relieving "stuck" digesters and that the quantities of lime needed can best be determined by reference to the volatile acids present. Lime additions made in amounts equivalent to 25 to 200 percent of the volatile acids, expressed as acetic acid, were found to have desirable effects which were in direct proportion to the amount of lime added. Dosages as great as 21.75 tons of hydrated lime per million gallons of digesting sludge were used without detrimental effect; and pH levels were raised to 10.0 by batch addition of lime without the development of adverse effects.

"Scientific Basis For Liming of Digesters". By C. N. Sawyer, F. S. Howard and E. R. Pershe, Mass. Inst. of Tech. *Sewage and Industrial Wastes*, August.

Animal Parasites In Sewage Effluents

Sewage treatment processes ordinarily used, with the exception of sand filtration, probably are not efficient in the removal of protozoan

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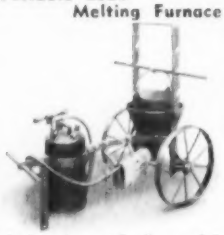

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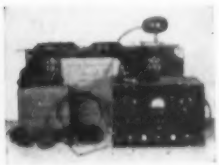

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In Appreciation

IN JUNE, 1946, Walter Sanderson and the writer, along with some hopeful Stockholders, established this business. We made our first sludge dewatering installation at Liberty, New York, in July, 1949. The operation was a success, and a number of Consulting Engineers were encouraged to utilize the coil spring type filter in connection with plants being designed in their offices. From 1949 through 1952, 21 more installations were made in the East, and as these units went into operation, each of them worked with a success that was indeed gratifying to all of us here, and led to (1) the construction of suitable manufacturing facilities for production of these machines and their auxiliaries, and (2) setting up a sales organization to work with Engineers to apply the coil spring type filter, now known as the "Coilfilter," for solution of their sludge dewatering problems. During the past two years 48 more units have been sold, of which a considerable number have gone into operation, again with unqualified success.

The writer is desirous of expressing his thanks to the Sanitary Engineering Profession for their acceptance and use of our equipment. We are mindful of our obligation to these Engineers and to the Operators and will maintain our standards.

In closing, let me say that when you are in the vicinity of Peapack, please stop in and visit with us. The manufacture of this equipment is most interesting, and we will be glad to see you.

Respectfully,
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cysts and helminth ova. This raises the question of the public health hazards in using sewage effluents for the irrigation of vegetables which are consumed raw or inadequately cooked. This paper reports the incidence of animal parasites in naturally contaminated sewage and irrigation water, and on vegetables irrigated with this water; and a study of the effect of primary sewage treatment plus chlorination, as practiced in the Denver, Colorado. sewage plant, on the removal of these organisms from raw sewage. It was found that such treatment removed only 80 percent of the *Ascaris* ova and 54 percent of the *End. Coli* cysts; 88 percent of these ova in the effluent were viable; the viability of the cysts is not clear. This primary treatment plus chlorination removed more than 99 percent of the coliform organisms and enterococci. No definite conclusions were reached concerning the public health significance of these findings, since little is known of the minimum infecting doses of these organisms.

"Animal Parasites in Sewage and Irrigation Water". By Wen-Lan Lou Wang and S. G. Dunlop, Instr. and Assoc. Prof. of Microbiology, Univ. of Colorado. *Sewage and Industrial Wastes*, August.

Sludge Digestion Experiments at Oceanside

Sludge digestion at the Oceanside, Calif. sewage treatment plant had never been satisfactory and a succession of plant-scale experiments were carried out over a period of about 18 months in an effort to break up the scum layer in the digester, correct pH, increase gas production and reduce odors. These experiments are described in this article. They included the addition of concentrated enzymes (Sea-Cal) to the primary digester; extended use of Pent-a-Vate, a soil conditioner for which some success in sewage plants was claimed; and addition to the primary of ammonium sulfate and lime, followed by trisodium phosphate. The next month they tried pumping into the primary digester an "activator"—supernatant liquor from a digester in which animal and vegetable waste had been completely digested; within a few days there occurred a scum break-up of major proportions. Following this, lime was added in doses of varying sizes over four or more months and fairly satisfactory results obtained. Meantime, odor complaints had been eliminated by blowing into the ventilating systems an odor-masking compound.

"Sludge Digestion at Oceanside, California". By E. O. Sampson, Foreman, Sewage treatment plant. *Sewage and Industrial Wastes*, August.

Recovering Precious Metals

The water from a plant of Oneida Ltd. consists of silver-bearing wastes, acid wastes, and others. The first were segregated to permit silver recovery. The acid wastes contain considerable quantities of copper, nickel and zinc. Laboratory and pilot plant study of methods for treating these wastes resulted in adopting the following procedure: a—Adjustments of pH to a value of 9.0. b—Addition of sodium hypochlorite to provide 7.5 lbs. available chlorine per lb. cyanide, and 2.5 lbs. chlorine per lb. cyanate. c—Standing for 10 minutes for oxidation of cyanide to cyanate. d—Addition of acid to pH 6.5 to increase the rate of oxidation of cyanate to carbon dioxide and nitrogen. e—

● TENNANT Sweeper cleans 48" path; replaces 3 to 12-man crew.

New Compact Machine Sweeps Gutters Walks and Alleys at 1/5 Usual Cost

BY SWEEPING congested areas with a new type power sweeper instead of pushbrooms, Akron, Cleveland and several other cities may save up to 80% this year in labor costs.

The new sweeper, shown at the APWA meeting in New Orleans last fall, is a compact heavy-duty machine. It cleans a 48" path and turns easily in a 5-ft. radius.

Its sweeping capacity is reported to equal that of a 3 to 12-man pushbroom crew.

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A 36" brush, in a vacuumized compartment, throws dirt forward into an enclosed 9 cu. ft. hopper. Sweeping speed, with 2-speed transmission, is 1½ to 8 MPH.

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Blending of acid wastes with alkali wastes for the dual purpose of lowering the pH for effective skimming and supplying heavy metals for the formation of a floc to entrain suspended matter. f—Addition of lime to increase the pH to 8.5 for precipitation of heavy metals. g—Thickening. h—Sand filtration. The plant has been in operation since December 1953, giving a consistently good effluent.

"Silverware Factory Recovers Precious Metal; Treats Others". By Charles A. Walker, Assoc. Prof. of Chemical Eng. Yale Univ. *Wastes Engineering,* August.

Pumps for Vacuum Filtration

A plant for vacuum filtration includes pumps for five purposes: feeding wet lime, feeding ferric chloride, pumping sludge over the filter unit, pumping the filtrate from the vacuum receiver, and pumping to create a vacuum in the receiver. For the first, the author uses a single-plunger standard sludge pump with dual ball valves on suction and discharge. For pumping lime slurry, he recommends a positive rotary with comparatively slow speeds. For pumping ferric chloride, he uses a Vanton pump, which is self-priming, and has no stuffing box, shaft seals, valves or gaskets to become clogged. For pumping filtrate, a self-priming centrifugal pump is desirable. For creating a vacuum, a vacuum pump of the Roots-Connersville type is recommended.

"How to Select Pumps for Five Steps in Vacuum Filtration". By E. C. Hammarstrom, Komline-Sanderson Eng. Corp. *Wastes Engineering,* August.

Brookline's Modern Incinerator

Brookline, Mass. operates an incinerator with a capacity of burning 300 tons of refuse in 24 hours. At first the Health Dept. established regulations providing for three-part separation into garbage, burnable rubbish and unburnable rubbish. But this separation resulted in difficulties in operating the incinerator and in making the service unnecessarily expensive, and the practice has been changed to combining the garbage and combustible in one container. This change in practice saves the city approximately $75,000 a year. For minimizing nuisance from dust, fog-producing nozzles have been installed where the ve-

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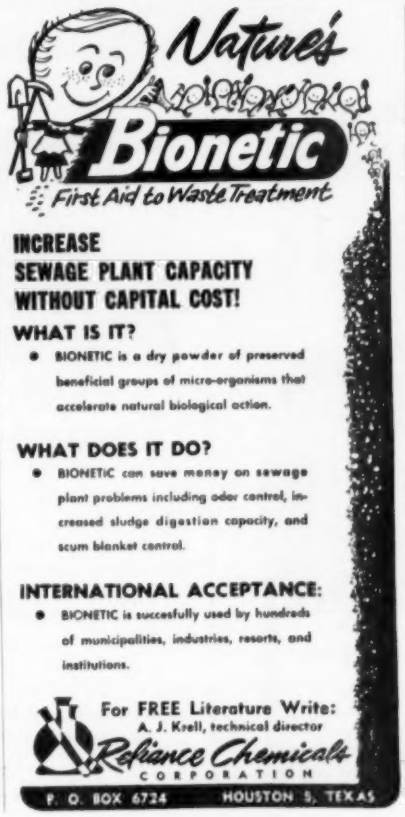
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hicles dump into the storage bins. The incinerator ashes are dumped on a traveling conveyor operating under water. All working spaces are ventilated through the fires and chimney. Adjoining the incinerator is a woodhog house, where trunks of deceased elm trees are chewed up for burning in the incinerator. The operation of the incinerator in 1953 cost $38,680. What was originally called the "dump" is now known as "Incinerator Park".

"Metropolitan Brookline Requires High Standards of Performance in Municipal Waste Collection and Disposal". By Walter A. Devine, Town Engineer, *Public Works*, September.

Composting City Refuse

A Technical Committee on Natural Resources, appointed in England in 1950, in June 1954 reported on the "Use of Towns' Wastes in Agriculture", considered chiefly from the point of view of conservation of natural resources; but also from the financial point of view. As to the latter it says: "Composting of household refuse and liquid sewage sludge by local authorities appears to be generally uneconomic". The fertilizing value of screened dust is low and costs of transport and application make its use uneconomical. As to the needs of the land for nitrogen so supplied, the household refuse of all of England and Wales in one year contains about 20,000 tons each of nitrogen, phosphoric acid and potash plus 4,000 tons of nitrogen in the putricible matter, and this added to the sewage sludge yields only about half as much nitrogen as is regularly applied in fertilizers. The committee suggests that it may be possible to recover nitrogen lost in the effluent from sewage works at a cost less than that of conventional methods of producing nitrogenous fertilizers. The belief that the fertility of agricultural land is declining is not true, since the yields per acre of the principal crops have increased during the past 50 years.

"Sludge and Refuse Composting Generally Uneconomic". *The Surveyor*, July 17.

Other Articles

"**How to Build** Better Sewers." By Robert G. Scott, V. P. Clay Products Ass'n. PUBLIC WORKS, September.

"**The BOD-OCD Relationship** in a Treated Industrial Effluent." By Sumner Kaufman, San. Chemist, Am. Cyanamid Co. Water and Sewage Works, August.

"**Treating Organic Wastes** on Experimental Trickling Filters." By Alfred B. Cherry and Louis A. Tucci, San. Eng'rs, Am. Cyanamid Co. Water and Sewage Works, August.

"**Sewer Inspection** and Cleaning." Procedure adopted by an English city. By P. Bradford. Contractors Record, Aug. 4.

"**Synthetic Detergents** in Sewage, Determination of," modification of the Barr method. By Gail P. Edwards and Martin E. Ginn, Prof. and Asst. of San. Chem., New York Univ. Sewage and Industrial Wastes, August.

"**Detergents**, Effects of, on Sewage and Sewage Treatment at Military Installations." by Harold A. Thomas, Jr., Assoc. Prof. of San. Eng., Harvard Univ. Sewage and Industrial Wastes, August.

"**Phenol Recovery** Plant, Design and Operation of a," at Bethlehem Steel Co. By James C. McCord, Asst. Supt. Sewage and Industrial Wastes, August.

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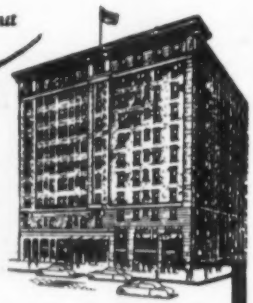

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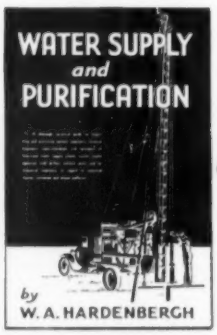

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Mexico City has a unique and serious sewer problem. Due to the settling of a large portion of the city, it is now approximately 20 feet lower than its sewer outlet, the Grand Canal. Until the condition is corrected and normal flow restored, there is a continuing problem of removing solids from the sewers, some of which are more than 300 years old. As a solution, the city has purchased over 200 "Flexible" Bucket Machines—one of which is pictured. Mexico City endorses "Flexibles" for their efficient performance and ease of operation and maintenance. We invite the opportunity to give your city an "on the job demonstration."

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Forming a Sanitary District

(*Continued from page* 100)

as far as material was concerned, was pipe which consisted of 38,690 lineal feet of 8-in. pipe; 139,260 ft. of 6-in.; and 99,560 ft. of 4 inch; plus accompanying fittings, fire hydrants, etc. The Board of Directors decided on American Cast Iron Pipe Co. Class 20 pipe having a 21,000-pound tensile strength and a 45,000-pound modulus of rupture, as this would result in a savings to the District of approximately $26,000, principally from the lesser weight. The Fox Hills well was furnished with a Lancaster submergible pump as an experiment to gain information for the District in comparison to line shaft pumps. The three Arapahoe formation wells are furnished with Peerless line shaft vertical turbine pumps. The entire water system from wells to the reservoir, reservoir to the distribution system, and from the distribution system to the ultimate consumer, is metered. The large meters on the line from the wells to the reservoir and from the reservoir to the distribution system are Sparling propeller type meters; the service meters are Worthington - Gamon Watchdog. All service lines from the distribution main to the property line are copper pipe and are installed and owned by the District, along with the meters.

Pumping

The water is pumped from each well to its individual 300,000-gallon concrete underground storage reservoir. The water is taken from each reservoir through individual sets of vertical turbine booster pumps, consisting at each pump site of two 125-gpm pumps and one 250-gpm pump, program-controlled by Healy-Ruff automatic controls. In case of power failure, the District has installed a Waukesha engine standby unit gas powered engine-generator set, which automatically takes over the generation of power following a four-second lapse of power from the main line and continues to feed standby power to the system for at least ten minutes, even though public power is resupplied to the District. All fire hydrants throughout the entire area are Mueller-Improved, all gate valves, meter yokes, etc. are also Mueller.

The distribution system, consisting of 4, 6 and 8-inch pipe, was installed by Parrish & Linneman, local general contractors. The four 300,000-gallon reservoirs, pump houses and administration buildings

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were constructed by Nielsen-Dougan, as general contractors.

During the period of receiving bids for materials, the South Adams County Water and Sanitation District Board of Directors spent some three evenings a week, averaging from 7 to 8 PM to 1 AM, in order to obtain, for the taxpayers, the best equipment possible for the least money. Their efforts have not gone in vain. The total cost of the project, including cost of construction, legal fees, land, engineering, etc. is approximately $1,235,000 as against a proposed cost on the engineering report of $1,350,000.

Progress in the industrial area of the South Adams County Water and Sanitation District prior to the installation of a water system and a sewerage system, was sporadic. It depended to a great extent upon the individual water supply from shallow wells which were in most cases either polluted or contaminated, or both, or from deep wells, which were expensive as an individual system. The public health problem from the possibility of unsafe water supply was great in this area, particularly from the residential standpoint; and because of the lack of a public water supply, fire damage in this area was always an enormous potential. The system, which has recently been completed, was happily received by the State Board of Health and the Tri-County Health Department, not only because it will furnish a safe, adequate and dependable supply of water for those connected with it, but also because it will, as a secondary feature, cause a reduction in fire rates. Since the installation of the water system, several real estate companies have proceeded with subdivision work within the boundaries of the District. One subdivision has already completed 42 homes, and others are in various stages of development. At the start of the program there were approximately 1700 homes in the area; now there are over 2500; and there are over 1200 additional homes in the planning stage. Each monthly Board Meeting finds the Board faced with lists of inclusions of properties.

At the present time the sanitation report is being revised in respect to the proposed sewer system and sewage treatment plant, which it is hoped will be under construction within the next year, thus completing the utilities program for this area. Following the installation of the water, the Public Service Company placed gas in the area, so sewerage is all that is now needed.

PUBLIC WORKS
EQUIPMENT NEWS

Published Monthly **October, 1954**

Compaction Roller Features Revolutionary Design

The K-45 "Kompactor" is said to provide faster, better and more uniform compaction. The four large diameter rolls are made of heavy welded steel segments placed in staggered rows. Efficient compaction is obtained because the segments which form the rolling surfaces enter the loose material with minimum displacement and leave without disturbing the compacted area. Thus, all compaction effort is downward and density requirements are met or exceeded with fewer passes. Easy to handle, there are many refinements—booster-type steering, 4-wheel air over hydraulic brakes, torque converter drive, etc. Weight is about 32,000 lbs.; the engine is

Maximum compaction and minimum disturbance are features of this roller

110 hp. diesel. Other information from Buffalo-Springfield Roller Co., Springfield, O., or circle No. 10-1 on the coupon.

Two New Front-End Loaders Introduced by Shawnee

Now available are two new heavy duty loaders by Shawnee—one, the Load-master for larger tractors, and the other the Special for smaller tractors. The basic design for the larger unit is the Fordson Major diesel tractor, and for the smaller one the Ferguson and Ford tractors. In the near future, these loaders will be available also on other tractors of comparable size. Both models are of all-welded construction and feature a two-pin installation for removal, which is possible in less than ten minutes. An oversize hydraulic system is provided. These are the latest addition to a large line of backhoes and loaders for use with many tractors. Full data from Shawnee Mfg. Co., Inc., 1947 N. Topeka, Topeka, Kans., or circle No. 10-2 on the coupon.

"Loadmaster" (below) and "Special", heavy-duty loaders made by Shawnee

Joint Sealing Compound and Joint Filler

"Posselit", a newly developed concrete expansion joint sealer, applied between concrete joints in the same manner as asphaltic or bituminous sealers, is heated in a double-walled melting kettle and applied at 160° to 180° C. Tests have proved that it stands up to jet-flame and blasts, and resists the solvent action of many organic liquids such as gasoline, mineral oils, benzol, kerosene and jet fuel. It is also acid resistant and unaffected by extreme heat and cold. There are other grades of Posselit for specialized purposes, such as for use in tropical climates, sealing vertical joints, and as a binder for roofing paper to concrete. Complete data from World Marketing Service, 150 Broadway, New York 38, N. Y., or circle No. 10-3 on the coupon.

SAFETY AREAS MARKED BY REFLECTIVE DISCS OR STRIPS OF PLASTIC

A plastic strip or disc, called Plastix, has been developed for safety markings on streets, highways and parking areas. The plastic is impregnated with thousands of glass beads which impart a high reflectivity to the markings. To place, an adhesive is applied to the pavement and to the marker, which is then firmly pressed into position. No large equipment is necessary. Bulletin PX-53 gives more details. Write to Prismo Safety Corp., Huntingdon, Pa., or circle No. 10-4 on the coupon.

No traffic tie-ups when applying Prismo Plastix Reflective Markers

Corrosion resistant protective coating. Rubalt "RA" black paint is a protective coating that will give maximum resistance to acids and alkalis, mineral oils, dust and dirt and algae growth; electrolytic corrosion is retarded or completely eliminated. Rubalt will adhere to galvanized iron, aluminum, magnesium or zinc without the use of a primer or surface treatment. Additional information from Alfred Hague & Co., Inc., 227 34th St., Brooklyn, N. Y., or circle No. 10-5 on the coupon.

New Motor Grader Has Many Improvements

A new Adams motor grader, the "330", with 75-hp International diesel engine is announced by J. D. Adams Manufacturing Co., Indianapolis, Indiana. It has 12-ft. blade and weighs 20,500 lbs. or more depending upon equipment. This is he latest of several new and improved models introduced by Adams recently, including the "660" with 140-hp. engine; the "550" with 115-hp engine, and the "440" with 85-hp engine. All models feature a fully-constant-mesh transmission with helical gears mounted on roller bearings; 8 forward speeds to 25 mph; 4 reverse speeds to 13 mph; optional "creeper" gears from ¼ to 1¾ mph.; rubber-mounted engines and a dual braking system wherein the service brake applies hydraulic pressure to a transmission brake as well as to the wheel brakes. These features are intended to speed and increase production, improve operator efficiency and add to grader life. A wide variety of optional equipment is available including power-shifted moldboard, bulldozer, scarifier, snow removal equipment, etc. An elevating grader attachment is available for larger machines. Descriptive literature may be had from J. D. Adams Manufacturing Co., Indianapolis, Ind., from your local Adams dealer, or circle No. 10-6 on the coupon.

Adams "330" motor grader, the latest of several recently improved models

Front End Loader has Front Wheel Drive and Rear Wheel Steer for Easy Operation

A new loader, the Lessmann GFT, has been announced. This has front wheel drive for added traction and stability and rear wheel steer for short turning radius. A power crowd permits filling the bucket without forward movement of the tractor. Four wheel brakes are provided; the bucket has 22 cu. ft. struck capacity and 28 cu. ft. heaped. A full line of attachments is available, including snow bucket, lift fork, dozer blade, crane hook and tine fork. More from Lessmann Mfg. Co., 20th & Easton Blvd., Des Moines, Ia., or circle No. 10-9 on the coupon.

Maneuverable Lessmann loader features power crowd for full bucket payload

Soil testing device, the Washington "Densometer", speeds tests in field

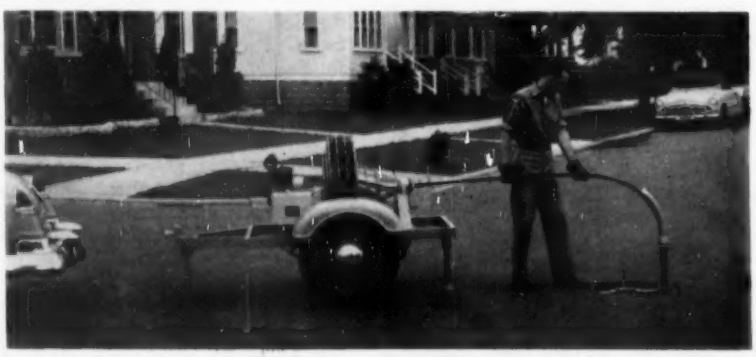
The Densometer for Field Soil Density Tests

Moisture-density tests for controlling compaction can be made quickly and accurately with this "densometer." It is said to be equally suitable for all soils—fine, coarse, granular base or surfacing. Highly accurate tests can be completed in three minutes after the hole is dug, and holes of any size up to 0.5 cu. ft. can be measured, and to 22 ins. in depth, singly or in successive lifts. Full data from Charles R. Watts & Co., 4121 Sixth Ave., NW, Seattle 7, Wash., or circle No. 10-7 on the coupon.

An ion exchange unit used for the processing of metal finishing wastes for chromium and other metal recovery is now available from Frederic B. Stevens, Inc., 1800 18th St., Detroit 16, Mich. Ask for bulletins P-112, P-114, P-115 and P-117, or circle 10-8 on the coupon.

This Cleaner Solves Many Municipal Sewer Problems

This machine, called the Sewer-King, is said to be able to handle both solid rods and flexible cable and to be designed for easy one or two-man operation. The "O.'B Power Transmission" permits use of heavy duty cable in continuous lengths to 200 ft. The operator can turn the cable and cutting tools, withdraw and coil the cable by power. Speed can be varied from 75 to 175 rpm to permit proper speed for each job. It can be used on lines 400 to 500 ft. long. It is available with gas engine or electric motor. Full data from O'Brien Mfg. Co., 5662 Northwest Highway, Chicago 30, Ill., or circle No. 10-10.



One man can clean sewers with this new O'Brien Sewer-King and a manhole guide

Base Paver Spreads Screenings Course 15½ Feet Wide

Blaw-Knox Base Paver spreads screenings in a recent operation on seven miles of the new Toledo Expressway. Screenings of ¼-in. dia. to powder were used, and the machine spread courses 15½ ft. wide, with depths of from 9½ to 10 in.

Marker Handles Traffic Paints or Reflective Compounds

This is a marking machine, with 2½-hp engine which will handle either the usual kind of traffic paints

Small municipalities will find this low-cost, versatile machine is ideal

or heavier compounds containing reflective materials. It insures a clean-cut line with widths of 2 to 4 inches. Ask for data on the Reflecto-Liner Jr. from Wald Industries, Inc., Huntingdon, Pa., or circle No. 10-11 on the coupon.

Flexible Steel Coupling for Large Diameter Pipe

For pipe from 24 to 96 inches in diameter, a new flexible steel coupling has been brought out by R. H. Baker Co., 2070 E Slauson Ave., Huntington Park, Calif. This is easy to install and makes a bottle tight seal, yet affords enough flexibility for expansion and contraction. No welding, only a wrench is needed. Gaskets are of Lastite rubber or of Lastite Neoprene. Data from the manufacturer, or circle No. 10-12 on the coupon.

Portable Steam Cleaner

This steam cleaner will jet out 1200 gals. of hot water an hour at 240 lbs. pressure. An automatic 40-hp steam generator in the unit develops 120 lbs. working steam pressure in two minutes from cold water and over 1100 lbs. of steam per hour. The unit is mounted on a two-wheel trailer, enclosed in a metal cabinet with large doors so that the operator easily can reach all of the controls. Fuel tanks for eight hours of operation and a float control water supply tank are incorporated in the cabinet. Further details from Vapor Heating Corp., 6420 W. Howard St., Chicago 31, Ill., or circle No. 10-13 on the coupon.

For Long Distance Measurements of Flow, Elevation & Pressure

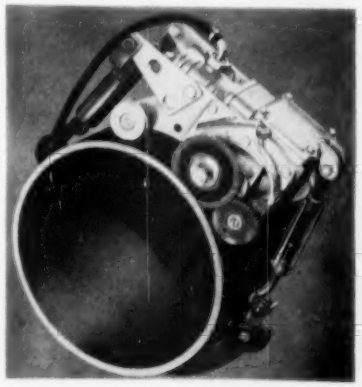
An impulse-duration telemetering system will transmit and receive long distance measurements of process flow, pressure, liquid level, temperature and other variations. It will, for instance, control reservoir levels. At 12-second intervals, the transmitter sends a pulse to the receiver proportional in duration to the variable being measured. The receiver automatically positions a recorder pen to reflect the change. There are few moving parts. All units are enclosed in a suitable case. Information and specifications from The Foxboro Co., Foxboro, Mass., or circle No. 10-14 on the coupon.

Visible Flow Chlorine Gas Feeder

This chlorinizer, Model EVS, is available in capacities of 4 to 400 lbs. per 24 hrs. with a metering range of 8 to 1 and an accuracy within plus or minus 4 percent. It has a panel with recessed, eye-level Sightflo indicator, flush-mounted gauges for chlorine and injector supply pressures, and adjustment knobs for chlorine feed rate and tray water flow. Other features include see-thru operating components, automatic safety devices, and elimination of chlorine ice troubles. The height is 66 in., width 17 in. and depth 12 in. Further details can be obtained from Builders-Providence, Inc., 345 Harris Ave., Providence, R. I., or circle No. 10-15 on the coupon.

Portable Automatic Pipe Cutter Can Work Under Water

This portable automatic pipe cutter will cut cast iron and steel pipe from 8-in. to 60-in. Available with either pneumatic or electric drive, the machine will operate completely submerged in water with either type of drive. The weight is 145 pounds and only a 12-inch maximum clearance around the pipe is required for operation. Manufactured by the Fein Co. of West Germany, this saw has been used in many other countries for the past 15 years. No pipe clamp or vise is necessary; the unit rotates only once around the pipe and joins the ends of the cuts together precisely. One water department reports making over 100 cuts on 8 to 36-inch pipe with the original blade. An 8-inch cut can be made in 5 minutes; 16-inch in 11 minutes; and 24-inch in 30 minutes. The machine can be set up by one or two unskilled men in 5 to 10 minutes. More information from H. R. Prescott Sons, Inc., Worcester, Mass., or circle No. 10-16 on the coupon.



Pipe cuts are made fast and smoothly with this simple, light-weight tool

Sedimentation Basin with Roto-Rake for Water Treatment

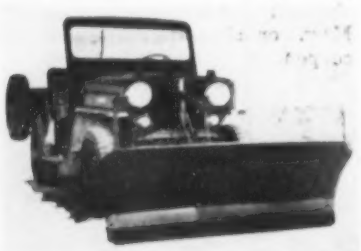
A "Roto-Rake" sludge scraper mechanism for use in water treatment plants has been announced by Graver. It can be installed in a steel shell on a concrete bottom or in an all concrete tank, and in existing basins. The inclined blades move the sludge to a center pit, providing a central collection point and easy removal. It provides uniform distribution of the incoming water, with maximum horizontal travel and decreasing velocity from the center toward the outside collectors. More data, plans and specifications from Graver Water Conditioning Co., 216 W. 14th St., New York 11, N. Y., or circle No. 10-17 on the coupon.

Power Steering Attachment for Cat Motor Graders

Power steering by a unit which is low in cost and can be attached to Caterpillar 12 and 112 motor graders is now available. An hydraulic pump is located on the front axle out of the way of dirt. Particularly good on ditching work, the unit locks front wheels in any desired position, holding the grader on its course. More from Rivinus, Inc., Eureka, Ill., or circle No. 10-18 on the coupon.

Snow Plows for Jeeps, Trucks and Station Wagons

Both straight blade and V-type snow plows for jeeps, station wagons and trucks are now being furnished by Arps Corp., New Holstein, Wisc. These are heavily constructed, have mushroom type skid shoes and operate with hand hydraulic or power lifts. Straight blade models are 27 ins. high and 72 to 96 ins. long; the V plows have plowing widths of 60 or 72 ins. For more data on these Blackhawk plows, write Arps or circle No. 10-19 on the coupon.



Blackhawk snow plow made by Arps Corp. fits jeeps, trucks and station wagons; both blade and V plows

Attractive Light Standard Designed for Low Cost Installation

The base and mastarm designs of this Millerbernd lighting standard greatly simplify wiring, enable the use of a lower-cost lamp ballast and better withstand impacts and vibrations, according to that company's engineers. The shafts are of extra-strength steel, cold roll-formed, resulting in a design which eliminates many parts. The "Elite" model is suitable for either underground or overhead wiring. Ask for booklet OTA, Millerbernd Mfg. Co., Winsted, Minn., or circle No. 10-20 on the coupon.

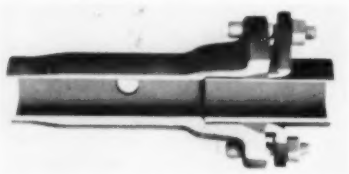
"Elite" lighting standard designed for simplified wiring and good looks

• • •

A portable primary jaw crusher uses a screen ahead of the primary crusher to by-pass material already down to size. This crusher, the 150 PRS, is mounted on a pneumatic-tired chassis, with weight distribution to meet state highway axle load limits. In operation, material is dumped onto the apron feeder which delivers it to the vibrating screen. This screen, in addition to allowing product size to by-pass the crusher, also enables rejection of quarry dirt. The feeder is controlled from the operator's platform. Moving height is 12 ft. 7 ins. Complete data from Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn., or circle No. 10-21 on the coupon.

Now Small Centrifugal Cast Iron Pipe in 18-ft. Lengths

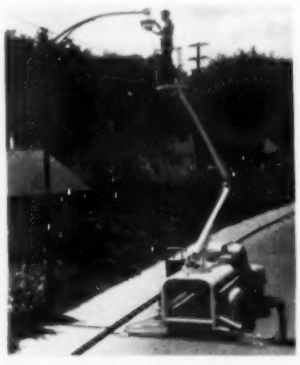
Cast iron pipe 2 and 2¼ ins. in diameter and 18 ft. long is being made centrifugally with DeLavaud centrifugal casting machines in the new McWane small diameter pipe factory. The pipe is furnished with bell and spigot or Boltite mechanical joints, and with a complete line of fittings. Pipe and fittings may be ordered tar coated, uncoated or cement lined. The 2-inch pipe weighs 6.2 lbs. per ft., including the bell. Each length has a tapping collar cast integrally with the pipe behind the bell. More from McWane Cast Iron Pipe Co., Birmingham, Ala., or circle No. 10-22 on the coupon.



Cutaway view of McWane 2½-in. mechanical joint pipe shows construction

New Series of Extensible Personnel Towers

These Hi-Ranger towers place a worker at maximum platform heights of 32 ft. and 40 ft. respectively (working heights are 5 or 6 ft. higher). A principal advantage of the new units is their flexibility in mounting. Series 3 can be mounted on any ¾-ton (or larger) pickup, utility or industrial truck; Series 4 can be similarly mounted on a 1½-ton or larger truck. Platform weight capacity of the Series 3 is 250 lbs., and 300 lbs. for Series 4. Complete data from Mobile Aerial Towers, Inc., 1405 N. Clinton St., Ft. Wayne, Ind., or circle No. 10-23.



Safe working platform of "Hi-Ranger" speeds utility jobs

Wagner Announces Two New Industrial Loaders for Ford or Ferguson Tractors

Capable of handling 1-ton lifts and ½-yd. loads, the new heavy-duty Model W7-FM Wagner industrial loader is mounted on the Fordson Major tractor and is powered by the Wagner independent hydraulic system. Fast lift and quick dump, with an unobstructed view

Wagner W7-FM loader is designed for Fordson Major tractor, lifts 2000 lb.

of the materials being handled are advantages. More from Wagner Iron Works, Milwaukee, Wisc., or circle No. 10-24A on the coupon.

A lighter weight loader is also made by Wagner, capable of lifts to 1500 pounds and with 11 cu. ft. capacity. This is mounted on Ferguson or Ford tractors and has the unusual and often handy quick-disconnect coupling. More about this from Wagner, or circle No. 10-24B on the coupon.

Automatic Control Valve Provides Smoother Pump Performance

This control valve automatically prevents surges from booster pumps because the pump is started and stopped against a closed valve. When the pump starts, the valve gradually opens allowing line pressure to increase slowly until a full pumping head is reached. In stopping the pump, the valve gradually closes, reducing the flow. When the valve is completely closed the pump stops automatically. Thus, the pump is controlled more accurately than is possible with manual operation. Also furnished is a control valve of similar design for deep-well pumps. Unlike the booster pump control valve, this valve is installed on a tee at the discharge of the deep-well pump, permitting the first rush of air and water to be discharged to atmosphere. Ask for Bulletins No. B-60P and No. B-61P, Cla-Val Co., Box 949, Alhambra, Calif., or circle No. 10-25 on the coupon.

Service Saddle for Pipe, 2-inch Through 12-inch.

These Dresser saddles have a wide range of fit so that they can be used interchangeably on asbestos-cement, steel and cast iron pipe. They are supplied with either corporation stop thread or IPS thread taps to 2 ins. The saddles are available heavily galvanized or with a special plastic dip which is non-toxic, does not "plate out" and has dielectric strength. Straps are flat, with rolled threads. Special rubber compound gaskets are cemented in place. More from Dresser Mfg. Division, Bradford, Pa., or circle No. 10-26 on the coupon.

Small Trencher for Service Lines and Foundations

This, Buckeye Model 403, is a small and easily handled ladder type ditcher which will cut to 5 ft. deep for 8, 10 and 12-inch widths, and 4 ft. deep for 14 and 16-inch widths. It is crawler mounted and has such low ground bearing pressure—7½ lbs. per sq. ft.—that it will not injure lawns or walkways.

Cost-cutting ditcher digs trenches for all kinds of service lines

It cuts a clean straight-sided trench, using one of 8 forward speeds. It will dig flush with buildings, foundations or pipes. Also, it will cut square trench corners. It discharges to either side of the trench. More from Gar Wood Industries, Wayne, Mich., or circle No. 10-27 on the coupon.

Turning Brush into Wood Chips Can Save Money

Burning brush, limbs and small tree trunks is hazardous and expensive. This chipper is made in several models which will handle

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SANITARY ENGINEER AVAILABLE

Graduate Civil Engineer, 28 years' experience in public works and sanitary engineering including water supply, treatment, distribution, sewerage and sewage treatment. Available immediately.

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Care of this magazine.

round wood from 4 to 8 ins. in size and strips 6 to 14½ ins. wide. The wood is reduced to small sized chips which are blown to the side of the roadway (in roadside cleaning operations). These chips disintegrate and enrich the soil. A new booklet "Real Brush Eaters" describes these units. It is available from Fitchburg Engineering Corp., Fitchburg, Mass., or circle No. 10-28 on the coupon.

Single Pass Portable Crushing Plant

This new crushing plant produces two sizes of gravel or rock on jobs where material does not have to be accurately graded. It consists of a hopper, grizzly, plate feeder, vibrator screen, jaw crusher, and sand conveyors, and is mounted on a rubber-tired full-trailer. It is recommended for jobs where portability and fast set-up are important. The weight is 24,500 lbs., and it can produce 40 to 75 tons per hour of 1½-in. material. Details from Iowa Manufacturing Co., Cedar Rapids, Iowa, or circle No. 10-29 on the coupon.

Highly Capable Sanitary and Public Works Engineer Available

A graduate civil engineer with 28 years of experience, including design, administration and management, in public works and sanitary engineering is available. His experience includes specifically water supply distribution and treatment and sewerage and sewage treatment. Known to and recommended by the Editor of Public Works. Will go anywhere if the job is challenging and interesting. Write or wire to Box 10L, Public Works Magazine, 310 East 45th St., New York 17, N. Y.

• • •

NEWS OF ENGINEERS

J. Wiley Finney, for many years with the Sanitary Engineering Division of the Tennessee State Health Department, joined the firm of Howard K. Bell, consulting engineers, Lexington, Ky., on Sept. 1. Wiley Finney has been associate Director of the Sanitary Engineering Division, responsible for water, sewerage and industrial waste. During the war, he served for five years, with distinction, in the Sanitary Corps, three years of which were in ETO with the Air Forces.

George W. Andress has been appointed Chief Engineer and Director of Public Works for Newark, N. J., succeeding John Flockhart recently named City Business Administrator. Mr. Andress, who has been with the city for forty years, has had a wide experience in municipal public works engineering. Heading the Department of Public Works, he will be responsible for the work of five divisions—Engineering, sanitation, water supply, public property and motors.

George C. Wallace has joined the engineering staff of Metcalf & Eddy, consulting engineers of Boston, Mass. Mr. Wallace was formerly Division Engineer, Sewer Division, Department of Public Works of the City and County of Honolulu.

Sol Pincus, consulting sanitary engineer, and former member of the WHO, has been invited to the International Congress on the Undeveloped Areas which will be held in Milan, Italy, in October. He will be a speaker at the meeting and after its close he will visit various public health activities in Western Europe.

Francis S. Friel, President of Albright & Friel, consulting engineers, Philadelphia, represented the United States at the executive committee meeting of the International Commission on Large Dams of the World, held last month in Paris.

Paul D. Haney has joined the staff of Black & Veatch, consulting engineers of Kansas City, Mo., and will be active in problems of water supply and treatment, sewerage, and waste treatment. Until recently, Mr. Haney was in the Public Health Service, at the Sanitary Engineering Center, Cincinnati. His previous experience included service as professor of sanitary engineering at the University of North Carolina, and with the Kansas State Board of Health before that.

License Examinations for New Jersey Operators

Examinations for licensing sewage and water plant operators have been announced by the New Jersey State Dept. of Health. Applications must be on file by November 10. Kenneth Carhart is Chief, Bureau of Examination and Licensing, Dept. of Health, Trenton 7, N. J.

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New HINGED PIPE CUTTER

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send for free literature on these amazing cutters for standard steel and cast iron pipe from 2½" to 12".

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Without obligation, please send me descriptive literature on your new hinged pipe cutters.

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Company_____
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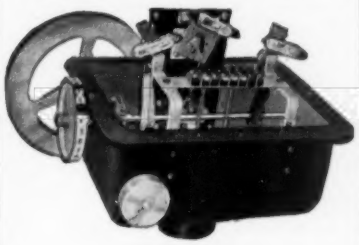
ROTO-TROL



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FILTER BOTTOMS

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—Worth Seeing

Stopping hay fever before it starts. One of McMahon Brothers' International truck-mounted chemical-spraying units working on a 3,560-mile contract for Sullivan County, N. Y. in a 3-season drive to eradicate ragweed in that area.

Combining welded wire fabric with asphalt in Cleveland's busy Public Square—the first of its type installed in Ohio. American Steel and Wire Division, U. S. Steel Corp. sends the picture of modern pavement laying.

Economy street sweeping on its way! Six of the 25 Conveyor Co. (Los Angeles) Mobil-Sweepers being shipped abroad in July. 16 went to Santiago, Chile; 2 to Rio de Janeiro, Brazil; 6 to Toronto and 1 to Manitoba, Canada.

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Before the blow.

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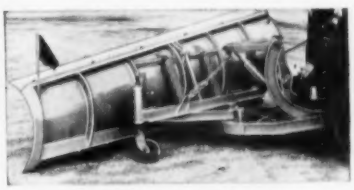

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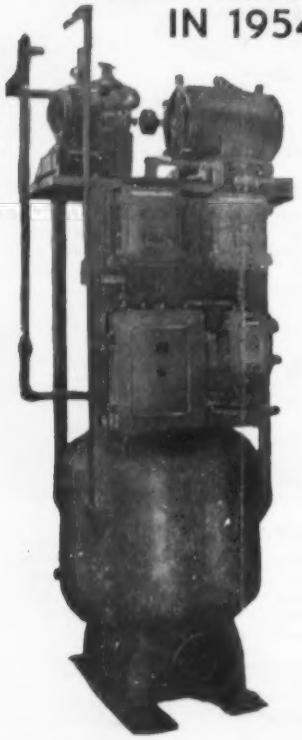

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WORTH TELLING

by Arthur K. Akers

★ CHICAGO PUMP Company has been purchased by Food Machinery & Chemical Corp. It will become an operational component of their Peerless Pump division but still under direct management of George D. Bers, president, and Milton Spiegel, vice president and general manager of Chicago Pump.

★ ARMCO Drainage and Metal Products starts two new plants soon at Jefferson City, Mo., and Tempe Ariz. Their 47th and 48th.

★ LE ROI Company names James R. Harwood sales manager, Transo division, front end loaders and concrete mixers. Also Jack E. Heuser, vice president, all sales.

★ RALPH CRONEMEYER of Air Placement Equipment Co., Kansas City, announces William F. Rutherford, eastern sales manager at Highland Springs, Va.

★ HUMAN INTEREST enters agreeably into the new "Cast Iron Pipe News," put out by that Research Association. Our columnist "Doc" Symons authors the leading article in the latest issue.

★ CHAIN BELT CO. opens three new district offices—Cincinnati, Charlotte, N. C., and Moline, Ill.

★ GEORGE E. FORD is new southeastern district manager of Highway Equipment Co., (Cedar Rapids) at Decatur, Ga.

★ AMERICAN BITUMULS and Asphalt Co. dedicated its new Cincinnati refinery on August 27. Capacity 300,000 gpd of asphalt products.

★ H. G. BAUER succeeds W. A. Neumann as vice president and general sales manager, DeLaval Steam Turbine Co., Trenton, N. J.

★ PRECISION Chemical Pump Corporation is the new name of Precision Machine Company, Somerville, Mass.

★ JOHN C. FINN is named New England sales agent for the U. S. Pipe and Foundry Co., in Boston.

★ JOHN PENDERGAST becomes sales manager, Foote Construction Equipment Division of Blaw-Knox, at Nunda, N. Y. He was recently with Contractors Machinery Co., Batavia, N. Y.

★ A. F. WOODS succeeds "Andy" Rubin as sales manager for the Marlow Pumps (Ridgewood, N.J.) division of Bell & Gossett Co.

★ GAR WOOD'S centralizing of sales program includes removal of all sales direction for shovels, cranes, ditchers, and other highway equipment from Findlay, Ohio, to Wayne, Mich.

★ HAROLD R. FOSNOT becomes sales manager of Graver Water Conditioning Division, New York.

★ According to the Denver *Post*, QUICK-WAY Truck Shovel Company of that city has been purchased by Penn-Texas Corporation. Former president Luke E. Smith of Quick-Way remains as consultant.

★ CAST IRON PIPE RESEARCH ASSOCIATION, Chicago, has added to its staff. Wallace T. Miller of Rochester, N. Y. For the past five years he has been general manager of the Rochester Division of the New York Water Service Corporation.

★ FRED L. GOLDSBY, general sales manager, Chicago Bridge and Iron Co., was elected a vice president of the company. A number of transfers have also been effected in their branch sales office managements.

★ THREE OLD MEN were discussing the ideal way of dying. Junior, aged 75, said he'd like to crash in a car going 75 mph. "Too slow," said the next, aged 85 "I'll take mine in a 400 mph plane wreck." But senior, aged 95, piped up wistfully, "What *I* would like is to be shot by an outraged husband."—Dickey Data.

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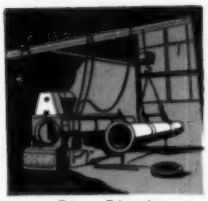

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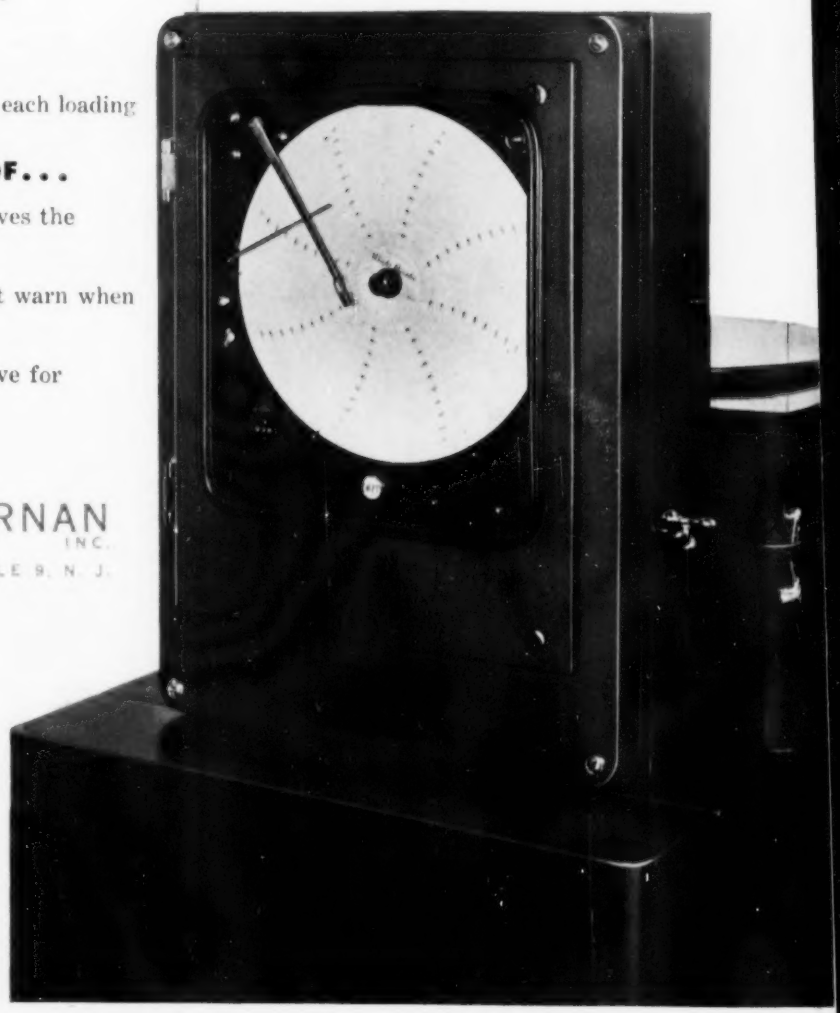

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